IRON AGE

THE NATIONAL METALWORKING WEEKLY A Chilton Publication OCTOBER 12, 1961

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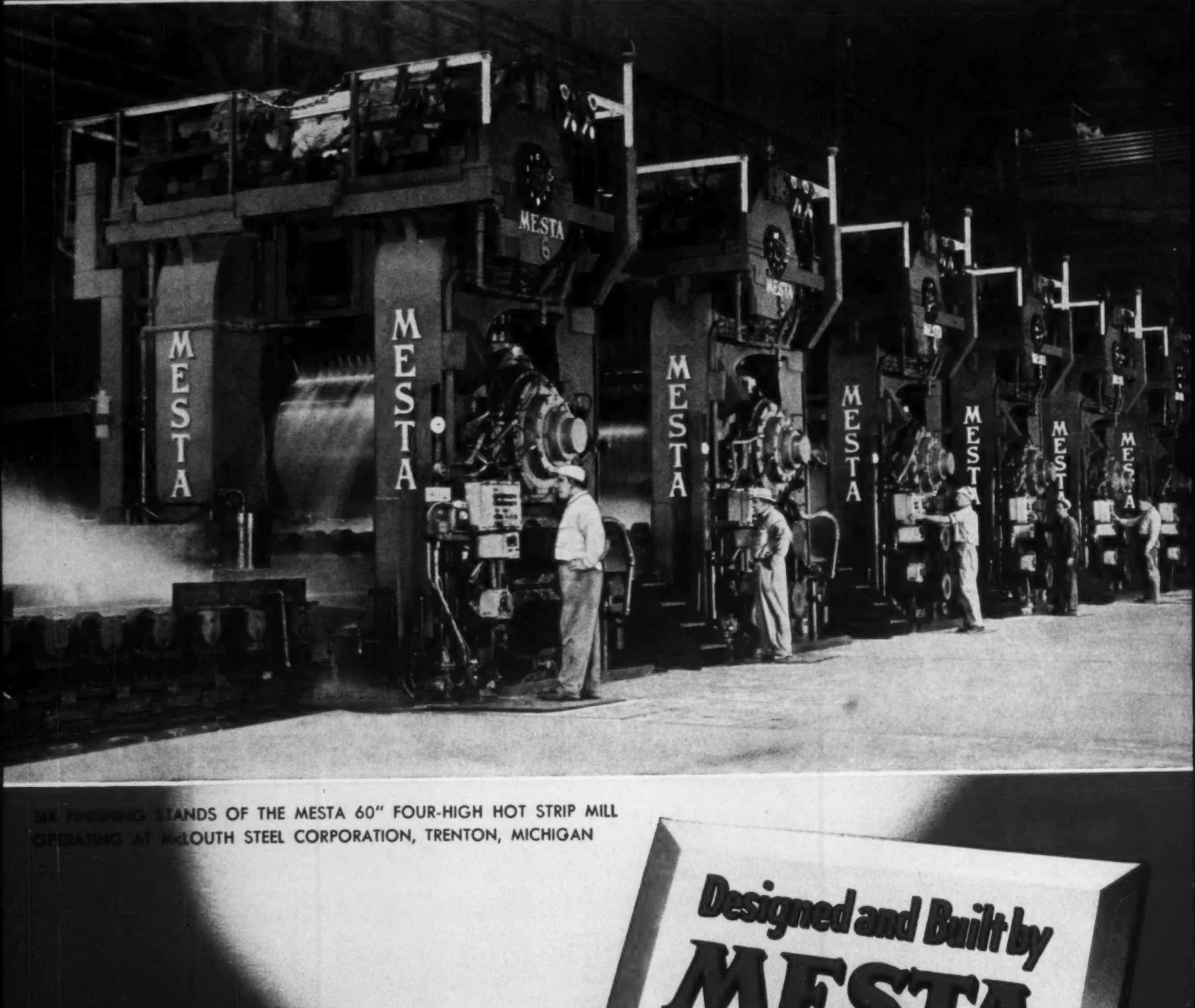
HOT STRIP MILLS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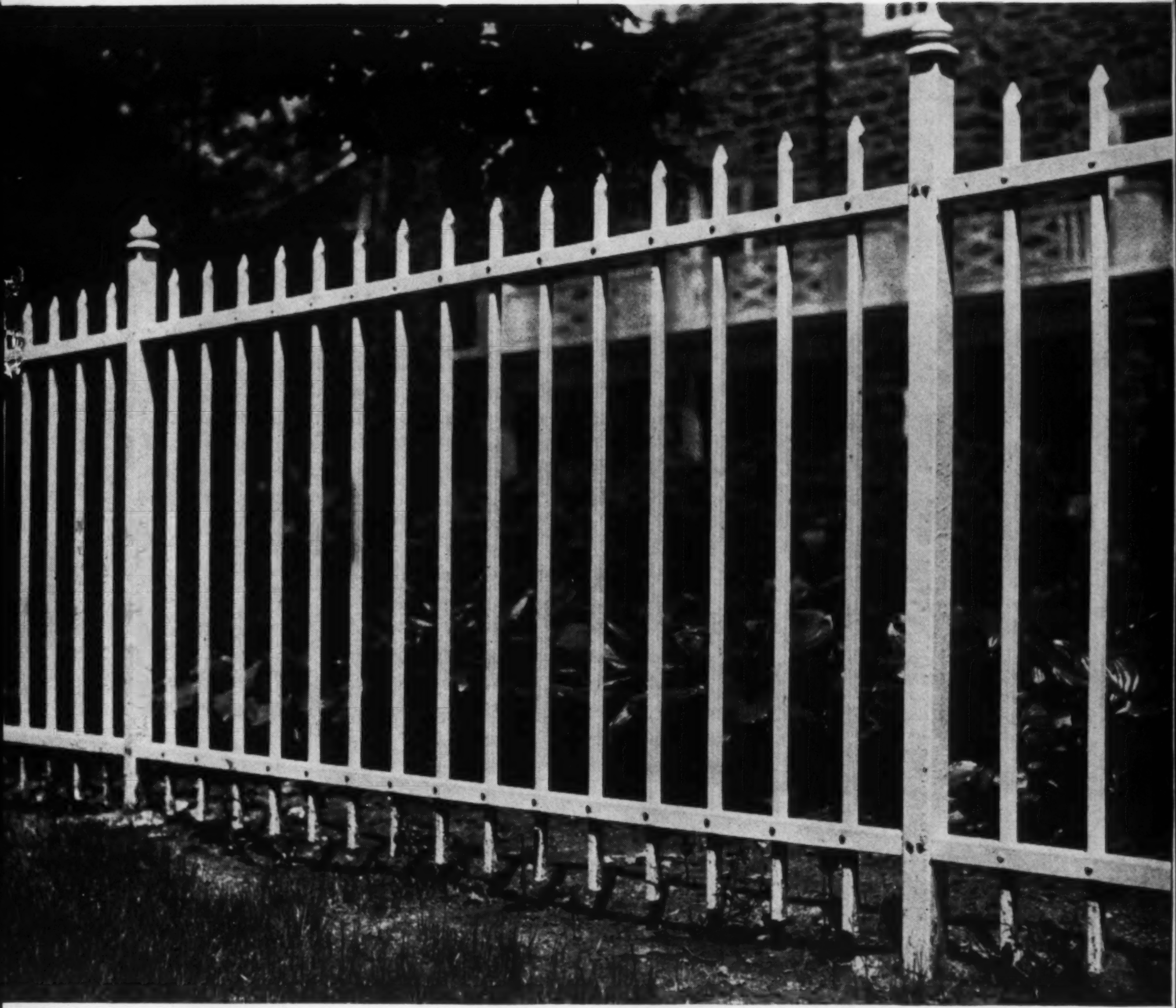

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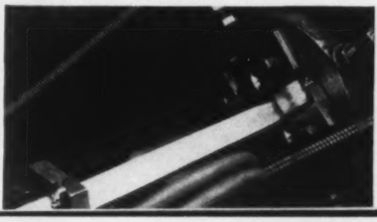
The mill that forms and welds the galvanized steel strip into tubing (above) also squeezes it into the final square cross-section (below).



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Philadelphia 39, Pa., SH 8-2000

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Indexed in Applied Science & Technology Index and Engineering Index

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The IRON AGE, published every Thursday by CHILTON COMPANY, Chestnut & 56th Sts., Philadelphia 39, Pa. Second class postage paid at Philadelphia, Pa. Price to the metalworking industries only, $2 for 1 year, $3 for 2 years in U.S. Canada $10, all others $15 for one year. Latin America $25. Other foreign $35. Single copies 50¢. Annual Issue $2. Cable; Chilton Philadelphia.

IRON AGE

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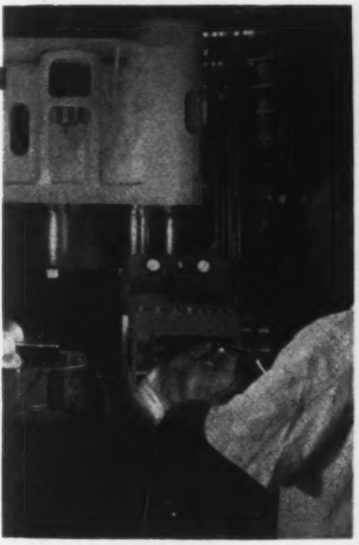
Special This Week



Forming Technology Is on the Rise

This week's special full-color report on forming is the fourth in a series on Metalworking's Technological Explosion. Forming methods dictate the shape of things to come. Our cover photo shows how The Martin Co. uses a 6500-ton Hydropress with a working pressure of 10,000 psi to shape rocket-engine cases. p. 153

Appliance Models, Sales Explode

Appliance makers report a third quarter sales spurt that, in some cases, is startling. The big question in many plants: How long can the model explosion go on without making profit inroads? The industry is looking for some way to solve this tangle. p. 123

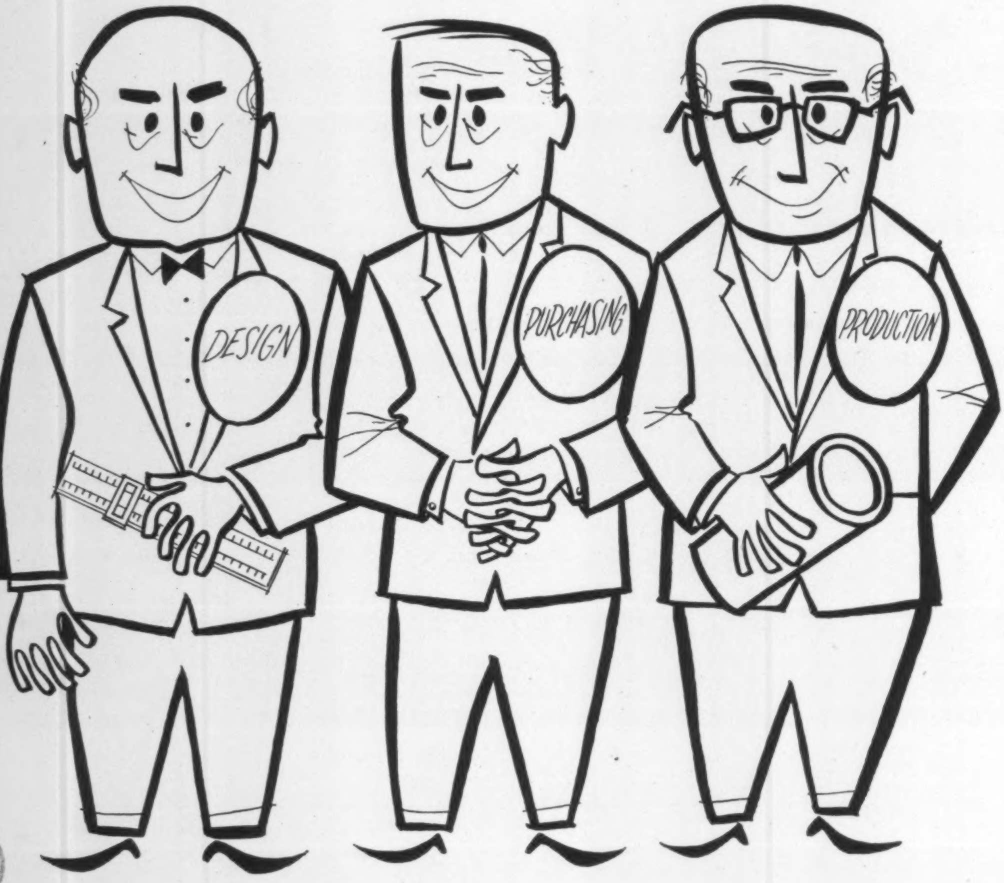
Abrasives Tear Down Machining Costs

High-powered surface grinders offer a challenge to conventional machining methods. Abrasive machining—slicing up to 1/4 in. of metal—reduces costs in five different areas. As the abrasive wears away, constantly-sharp cutting edges are exposed. p. 165

Next Week

Open Coils Receive Chrome Treatment

Gas alloying is now being used to diffuse chromium into open coils of steel. The chromium forms a metallurgical alloy on the coil's surface. This alloy has the traits of corrosion-resistant stainless steel. Next week's report tells the full story.



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EDITORIAL

Foot-in-Mouth Disease: We Can Do With a Little Less

If you were playing poker, would you tell the other fellow what you had in your hand? If you were negotiating for a new home or other property, would you disclose the top price you would pay—early in the game?

Of course, you wouldn't. If you did, you ought to have your head examined. Yet each week the future of the United States is being blabbed away by government emissaries, self-appointed ambassadors of hokum, and just plain foot-in-the-mouth guys.

It is the fashion now to ask newsmen that they hold their fire or that they decide what's good for the nation and then write accordingly. The responsibility does not lie with reporters. It lies with the "important" man who talks too much. It lies with the man who places his political future above the future of the nation. It lies with those fellows who just can't resist being a big shot in front of anyone they think will print what they say.

Mr. Kennedy, thanks to at least two of his supporters and advisors, has lost a lot of the bargaining power over Berlin. Khrushchev already knows—or thinks he knows (which is even worse) —what we will take in return for his "demands."

There was no call for Senator Humphrey to make any statement about negotiation of the East German-Poland border. There was no need for Gen. Clay to talk off the record about what the West Germans might do in dealing with East Germany.

For you or your neighbor to express your opinion is free speech. But for men who have a quasi- or at least a semi-official government position, it is poison to put one foot in the mouth, let alone both feet.

This need for Mr. Kennedy's balloon putter-uppers to button up their mouths is urgent at this time—more so than at any time in our history. Responsibility for this is not up to newsmen or editors of our newspapers. They have enough trouble trying to keep from printing some of the absurd and at times screwy statements from far and wide.

It is time this government took more time to think, digest, and analyze what it is going to say —before it says it. Then the opportunists or the publicity seekers in office should have the ball bat used on them if they fritter away our nation's negotiating points.

Never was the zipper needed so much as it is now for the flapping jaws!

Tom Campbell

Editor-in-Chief

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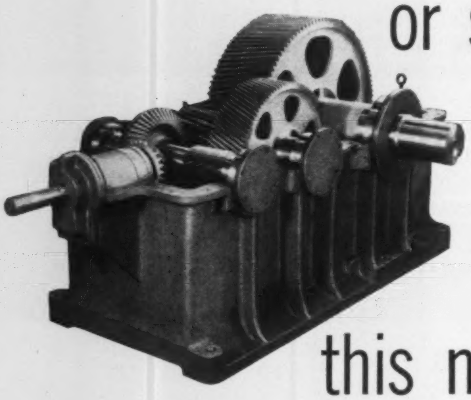

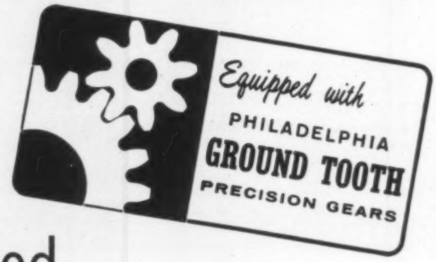
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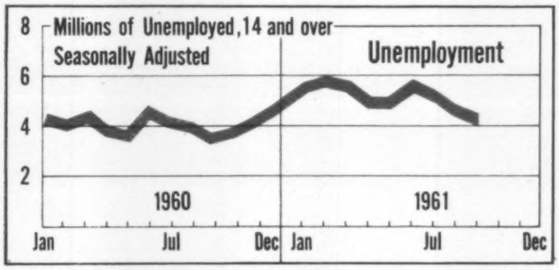
Jobless Ranks Thin—Slowly

Most of the news on September employment is good, but not spectacular. The nagging high rate of unemployment sticks for the tenth straight month at a high adjusted level—6.8 pct in September.



But unemployment among adult men dropped more than seasonally to 5.7, down from 6.1 pct in August. And long-term jobless ranks were thinned by almost 200,000, also better than seasonal.

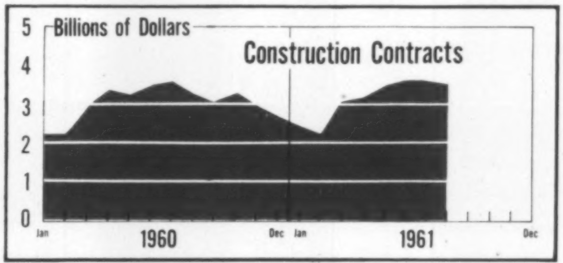
It would be hard to find anything on the business horizon that would block further employment recovery in the months ahead. But like the recovery in general it will be a "chipping away" process rather than big jumps.

Construction Due to Hit Peak

Contracts for future construction slipped slightly in August from July. But August contracts were still a record for the month. Contracts valued at $3.5 billion were signed.

The strong August showing was due to a pickup in highway and utility construction and continued gains in apartment construction.

Heavy engineering contracts in August totaled $866 million, up 26 pct over year-ago dollar value. Residential contracts, due largely to apartment building running at twice last year's volume, rose 11 pct to $1.6 billion.



The F. W. Dodge Corp. index in August rose to 293, the highest reading since last December. This means a record, or near-record, amount of actual building will get underway in the months ahead and help fulfill the promise of a prosperous fourth quarter.

Cost Pressures Spur Spending

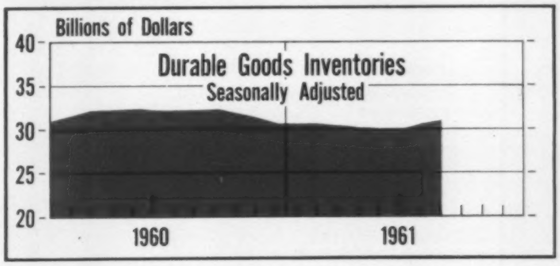
The feeling is growing that the trend in new plant and equipment spending will be sharply upward next year. Reason: To cut manufacturing costs.

It is now clear to many companies that if they are to compete in the world market they must get costs much lower than they are now.

Stock Buildup Rules Durables

Inventories of durable goods makers increased by $400 million from July to August. These stocks, seasonally adjusted, now stand at $30.8 billion. This is the highest dollar value level since February.

But the big point is that stock accumulation is firmly underway. Stocks leveled at $30.2 billion in April and May after an 8-month steady drop starting in September, 1960. In July, stocks rose by $200 million.

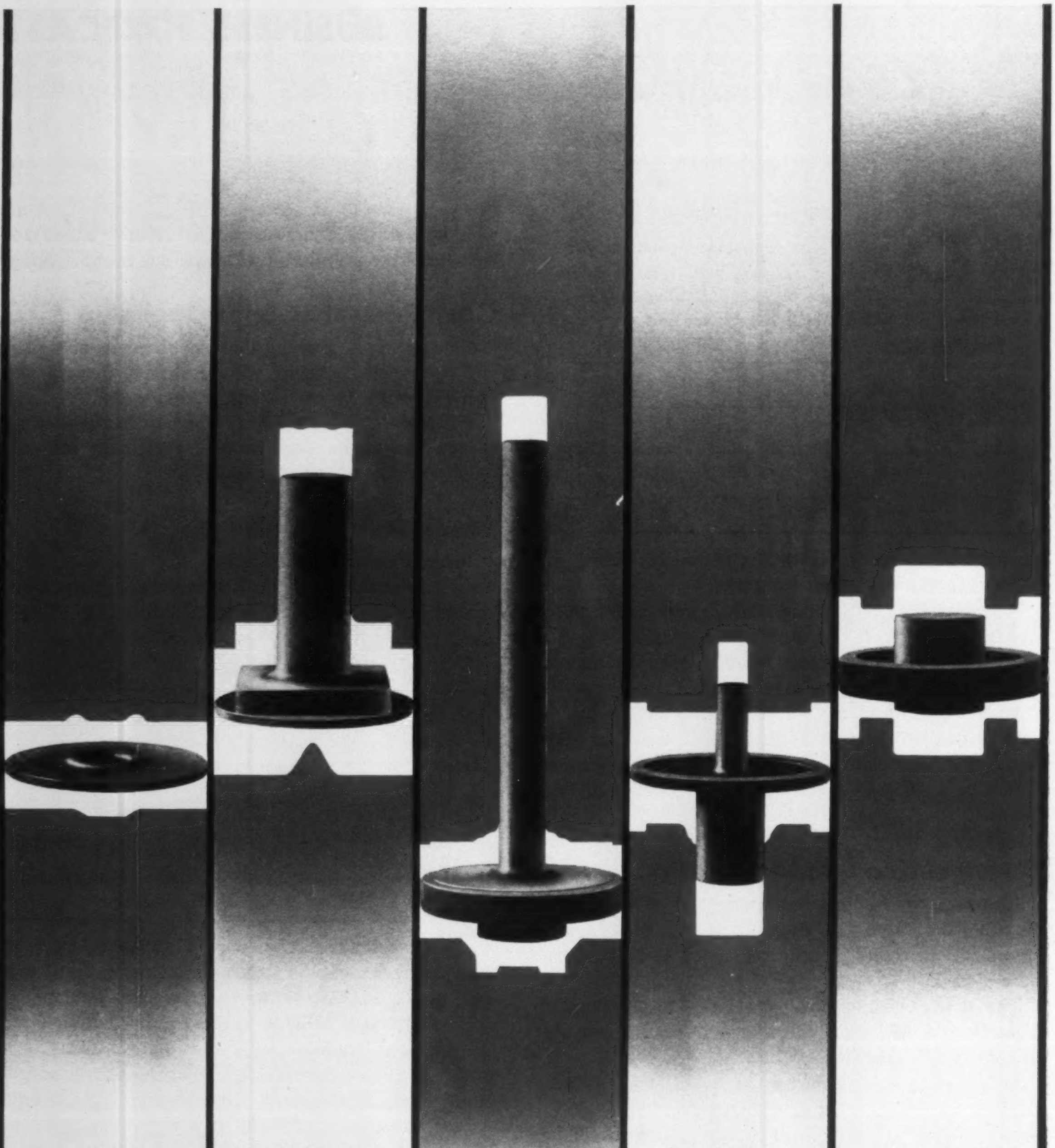


The inventory buildup is sparked by durable goods sales that are running well ahead of shipments. And with new orders continuing at a brisk pace, it appears durable goods inventory accumulation will continue. Inventories rose by 1.3 pct from July to August. But new orders rose by 3.3 pct.

Instalment Credit Expands

Outstanding consumer credit increased by $26 million in August to $42.6 billion. This is another point in the saw-tooth pattern of consumer credit for the year so far. In four months, credit went up; in the other four it went down.

But look for instalment credit to break out of its bumpy pattern soon. Both seasonal and recovery-pushed fall and winter retail sales will rise and pull instalment credit along. Also, auto sales should jump. Normally, 35-40 pct of all instalment credit is generated by auto financing. This area has been dormant.



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Material: E-4350-1 Alloy Steel
Billet: 1.285 Dia. x 6.42 lg.

Material: 4350 Steel
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Paycuts at A-C—For Salaried Only

Allis Chalmers Manufacturing Co., Milwaukee, indicated last week that it would begin a series of salaried cuts effecting its 13,000 salaried employees in the U. S. and Canada.

The company is engaged in preliminary negotiations with the United Autoworkers for a contract covering eight plants. The contract expires Nov. 1.

The cuts amount to 5 pct for employees earning less than $10,000 per year. The cut is larger, up to 10 to 15 pct for salaries over $10,000.

The company earlier cut its stock dividend from $1.50 to $1.00. In letters to employees, the company stated it regarded the cut as an interim measure, until cost reduction programs already in progress could take effect.

Low prices for finished goods were cited as an important factor in the need to cut costs.

UAW: Strike Cost Union, Too

UAW reports that local strikes at General Motors Corp. cost $5,070,000 in strike benefits.

Checks totaling that amount were sent to 80 local unions last week (according to the union). The benefits were for one week at $15 for a single person, $20 for a married person and $25 for a family.

Most money went to Chevrolet Local 659 in Flint ($255,200).

NLRB: Is It Anti-Management?

Industry can be pessimistic about the chances of favorable rulings from the present National Labor Relations Board. The board, in a key decision, recently voted four to one to make General Motors bargain on the question of an agency shop for Indiana plants.

The reasoning, which overruled a previous NLRB ruling, came as no shock to company lawyers, although three board members are holdovers from the Eisenhower administration.

The NLRB was already on the liberal side before the election, some labor authorities contend. With two Kennedy appointees now serving, the outlook for management is now discouraging.

Teamsters: Hot Cargo Clauses Illegal

Teamster Union "Hot Cargo" clauses in labor-management contracts are illegal. National Labor Relations Board says that these controversial clauses violate the prohibitions in the Landrum-Griffin Act against secondary boycotts.

Independents Beat USWA Rates

Production and maintenançe employees of Weirton Steel Co. (division of National Steel Corp.) received wage increases ranging from 7 to 10 cents per hour on Oct. 1.

According to Weirton, this increase will bring the minimum wage at Weirton to $17.20 per day. **This, the company says, maintains a basic labor rate bulge of 5 cents per hour higher than the industry in each job class.**

Plan Ahead, Mr. Goldberg

Secretary of Labor Arthur J. Goldberg will have to start soon on plans to avert a long and bitter steel strike next year.

Since Mr. Goldberg has been through all this on the Steelworkers' side, he knows that he can't wait until the last minute.

The paradox is that the same man who argued so eloquently against invoking the Taft-Hartley Act in 1959 will have to take the other side this time. In actual court work, of course, his role would be in the background.

The auto strikes set an example of what can happen. Even though the major issues were virtually settled, this did not prevent long and costly walkouts over local issues.

When the steel negotiations come up, the issues will be more bitter and negotiators still carry unhealed scars from the bitter battles of the 1959-60 negotiations. In short, the issues are the same; the parties the same, bitterness unchanged.

The President is committed to exerting pressure against unreasonable wage demands if steel prices are not increased. Of course, this has a wide range of interpretations, depending on the side of fence. In addition, work practices and the historic 2-B contract clause, apart from wages, are still an issue.

Things to remember: Steel companies will turn a completely deaf ear to any demands that affect costs—if they are to keep costs under control.

Add to that: Mr. Goldberg will not be arguing labor's case this time. And he will be arguing for a settlement. Mr. Goldberg is a "deal" man. U. S. Steel chairman Roger Blough is not.

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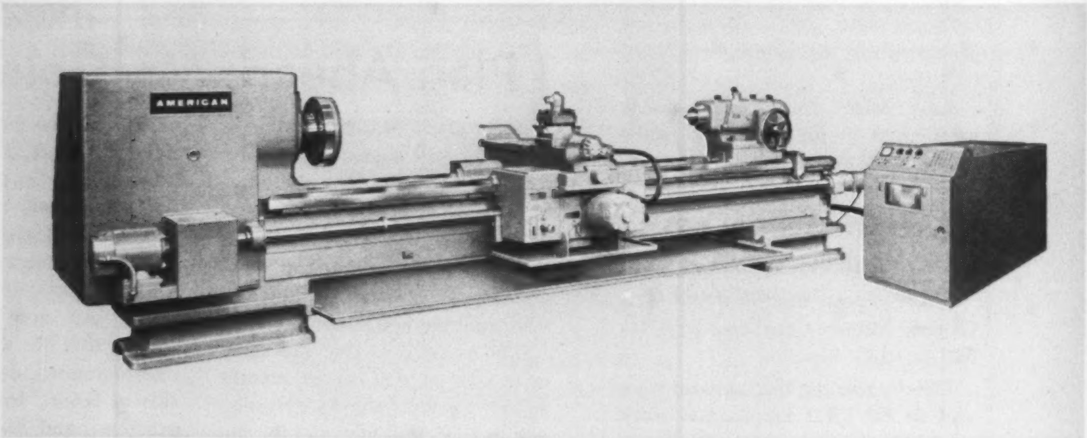

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Pentagon Loses Buying War

Congress is slowly winning its war with the Pentagon over procurement practices.

But the military, resentful of having some comfortable nests disturbed, is sniping away at its critics.

Senator George Smathers (D., Fla.), claims the Pentagon wastes up to $4 billion a year because of unnecessary red tape in its purchasing customs.

Some Pentagon procurement practices "should have been retired from the armed forces along with the three-masted ship and the smoothbore musket," he says.

Centralized procurement of common-use items—such as food, clothing, auto parts—is now handled by a central buying agency that fills Army, Navy, and Air Force needs. Other items are slated to be added, leaving eventually only the procurement of weapons in the hands of each branch of the service.

Congress has been insisting on this move for years. But it wasn't until Defense Secretary McNamara came along that big strides in this direction took place.

Military supply men snort that "the efficiency boys" are creating a large bottleneck in supply which could turn out to be "tragic" in time of war.

Instead of permitting each branch to do its own ordering, all buying now has to be funneled through a common office. And a big rush of emergency orders could have a paralyzing effect on the central office, they claim.

Also, the Kennedy administration is combining agencies and building huge military empires at the same time it insists through the Justice Dept. that many big corporations be split up into smaller components.

This inconsistency hasn't slowed either Secretary McNamara or congessional critics of the old ways of procurement. The reforms are moving ahead and critics have to be content with rear-guard delaying tactics.

Defense Contractors Face Ad Restrictions

Pentagon brass have put the final touches on new regulations banning use of government funds by defense contractors for institutional advertising.

Under regulations recently issued, defense contractors will be able to include in contract costs only advertising for:

Recruiting personnel required to perform the contract work.

Procurement of scarce items required under the contract.

Disposal of scrap or surplus materials acquired under the contract.

The new rules were drafted under a provision of the new defense money bill restricting defense contractor advertising. The new regulations also outlaw color or "excessive" size ads. Those offering excessive salaries or other special benefits intended to "pirate" employes of other defense contractors are also outlawed.

Antitrust Issue Kept Hot in Hearings

The Senate Antitrust and Monopoly Subcommittee is keeping the coals hot under its drive to toughen Federal antitrust laws.

While most lawmakers were content late last month to bank their fires until January, Subcommittee Chairman Estes Kefauver, D., Tenn., and Senator Roman L. Hruska, R. Nebr., resumed hearings on the five-bill package.

Star witness was FTC Chairman Paul Rand Dixon.

Dixon urged passage of all the bills, especially those fixing top industry officials with responsibility for antitrust activities of subordinates, and he favored setting stiffer penalties for repeated violations.

Dixon also favored a provision to require signed non-collusion affidavits from businessmen bidding on government contracts worth more than $10,000.

Another witness, Charles W. Gasque, Jr., of the bid-judging General Services Administration, wants such affidavits on contracts as low as $2500.

While Kefauver won't be able to vote out any of the bills until Congress reconvenes in January, he is building a strong word case for each in the meantime.

Navy, Air Force In Tailspin Over Plane

The Navy and Air Force can't agree on a single type of fighter plane to meet the needs of both.

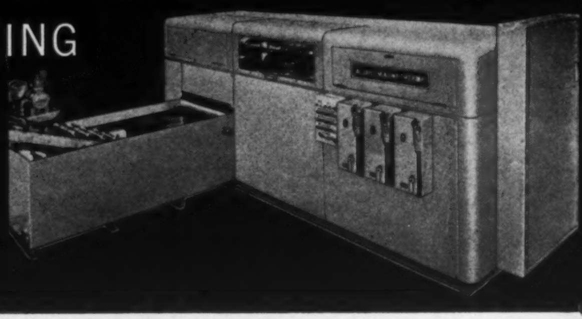
While both services agree such a project would save taxpayers about a billion dollars, neither seems to have any use for the kind of airplane the other wants. They have gotten together to try to come up with a single type.

The Navy says it must have a plane less than 56 ft long to fit the decks of its carriers. But the Air Force wants nothing shorter than 73 ft. Range of the Air Force fighter must be extremely long. The Navy needs less range but about double the payload capacity.

Pentagon spokesmen are pessimistic about chances for reconciling enough differences

AUTOMATIC CAMSHAFT HARDENING

...one of many ways High Frequency Induction Heat-Treating can increase production and reduce costs!



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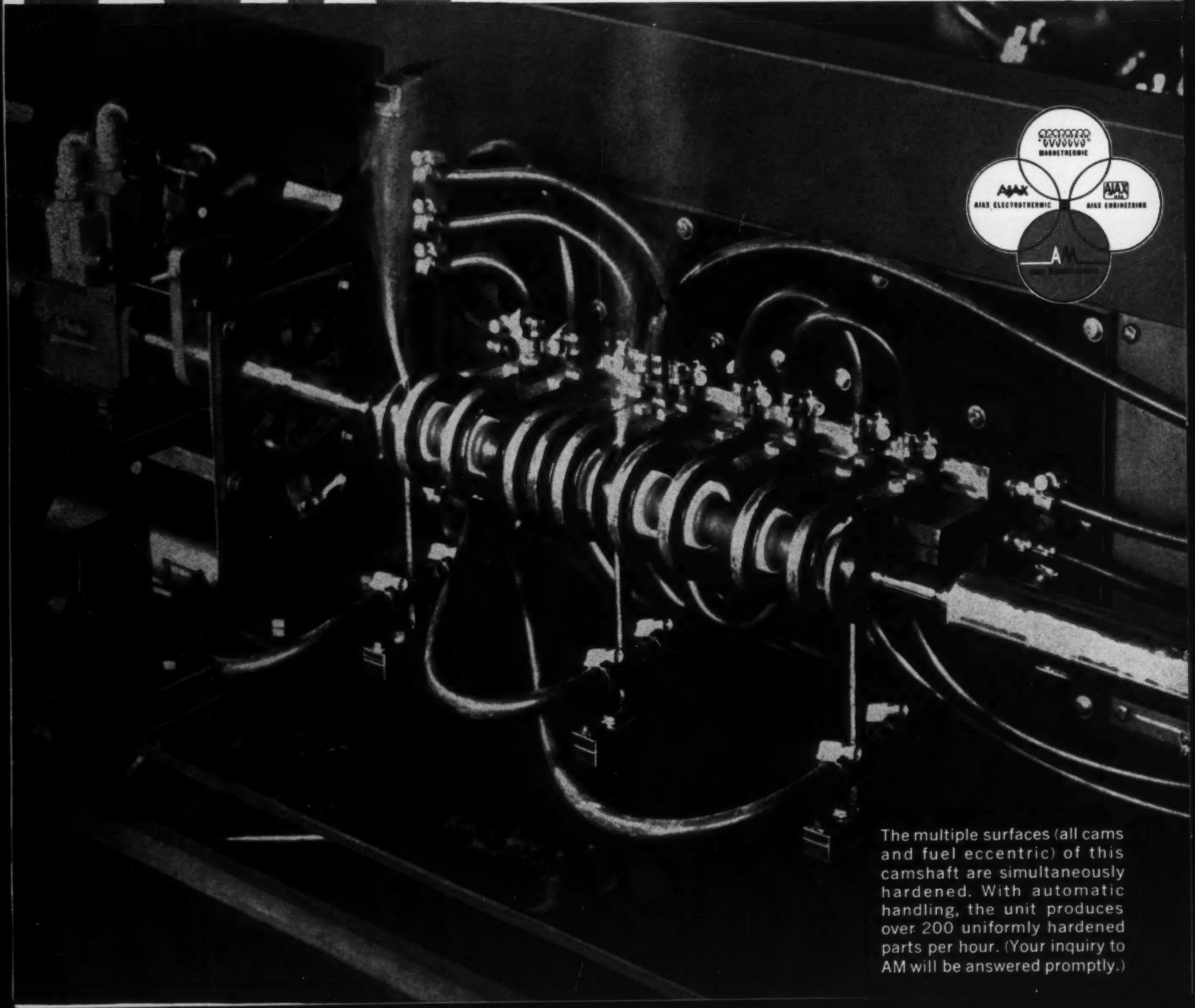


The multiple surfaces (all cams and fuel eccentric) of this camshaft are simultaneously hardened. With automatic handling, the unit produces over 200 uniformly hardened parts per hour. (Your inquiry to AM will be answered promptly.)

Japanese Advance Despite Slowup

The go-slow pace in Japan due to the exchange imbalance of trade may slow up more projects. But the slump will be temporary.

Japanese steelmakers still forecast a 48-million ton output by 1970. In fact, many figure production will top 50 million tons by then. This will mean far more coal, coke and iron ore will be needed than was expected.

Iron ore imports are expected to top 60 million tons by 1970. The figure was 44 million tons earlier.

Outlook: Japanese will control their international balances. But they will try to have their cake and eat it too. It can't be done, but they will try.

Poor Design Hurts Red Tool Sales

A top U. S. designer says poor industrial design is hurting communist countries in the world markets.

Just back from a meeting of the International Council of Societies of Industrial Designers, Peter Muller-Munk says it was the first such session to draw delegates from Iron Curtain countries.

U. S. machine tools outsold Russian models at the Vienna Fair, Mr. Muller-Munk reports. This, despite higher prices and no greater functional superiority. "Our tools won out because they were better organized by industrial designers."

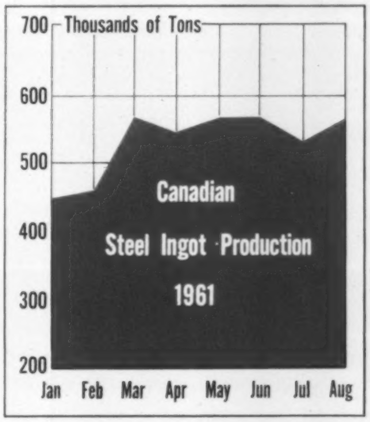
No Boom: Canada's Upswing Is Steady

Canada's upswing is firmly under way in most sections of industry. The economic recovery to date has been gradual, rather than spectacular.

But signs are multiplying that indicate the business pace is now expanding more rapidly. Steel production in the week ended Sept. 16 was 133,195 tons, 23.8 pct above the previous week's output and 21.6 pct above a year ago.

Other signs of improvement:

Exports are rising sharply, buoyed by renewed growth in the U. S. and continuing expansion in Western Europe and Japan. In the second quarter, an 8.3 pct gain lifted the six-month export total to $2.679 billion, 3 pct above the 1960 total. June exports were up 12 pct.



Imports rose only 1 pct in the first half, to $2.776 billion. Imports showing the sharpest decline have been autos and auto parts, nonfarm machinery, electrical apparatus and rolling mill products.

Canadians agree the economy is not heading into a boom. But the broad base of improvement lends hope that the upturn will continue well into 1962.

Venezuelan Slump

The expected business upturn hasn't materialized yet in Venezuela.

Depressed conditions have improved somewhat. But there is no sign of a sustained improvement.

In recent months, leftists have pulled in their horns more.

World Business Report

Here are this week's key items of metalworking interest from many corners of the business world:

Spain: Caribbean Steamship Co., a Reynolds Metals Co. subsidiary, has ordered three large ocean barges, worth $1.320 million, from Ciudad Espanola de Construccion Naval shipyard at Bilbao, Spain. They will haul bauxite from South America to Reynolds' U. S. plants.

Turkey: Eximbank has okayed a $1.6 million loan to Turk Willys-Overland Fabrikalari, S. A., of Istanbul. An affiliate of Willys Motors Inc., Toledo, O., the company will expand production in Turkey from 2000 to 7000 jeeps per year.

Belgium: Metallurgique d'Esperance-Longdoz, S. A., steelmaker of Liege, Belgium, has begun the second phase of a five-year expansion program. Two oxygen converters and a semi-continuous mill for wide sheet are being installed.

Japan: Crude steel production in the first half of 1961 totaled 13.230 million tons in Japan. In July, 2.419 million tons was the output, biggest single month on record, raising the seven-month total to 15.649 million tons. This pace will break 1960's total production record of 22.138 million tons.

France: Lorraine-Escaut Steel Co. is building the world's first unit to glass extrude long-length carbon steel pipes at the Anzin plant. It will be the first to use the Ugine-Sejournet process for carbon steel tube production.

India: Jessop Steel Co., Washington, Pa., is joining with Vummidiars Private, Ltd., of India, to build a $5 million alloy steel plant in Madras. Capacity will be 10,000 tons of finished alloys per year.

NEW—TWO LOW-COST MINIATURE BALL BEARING LINES

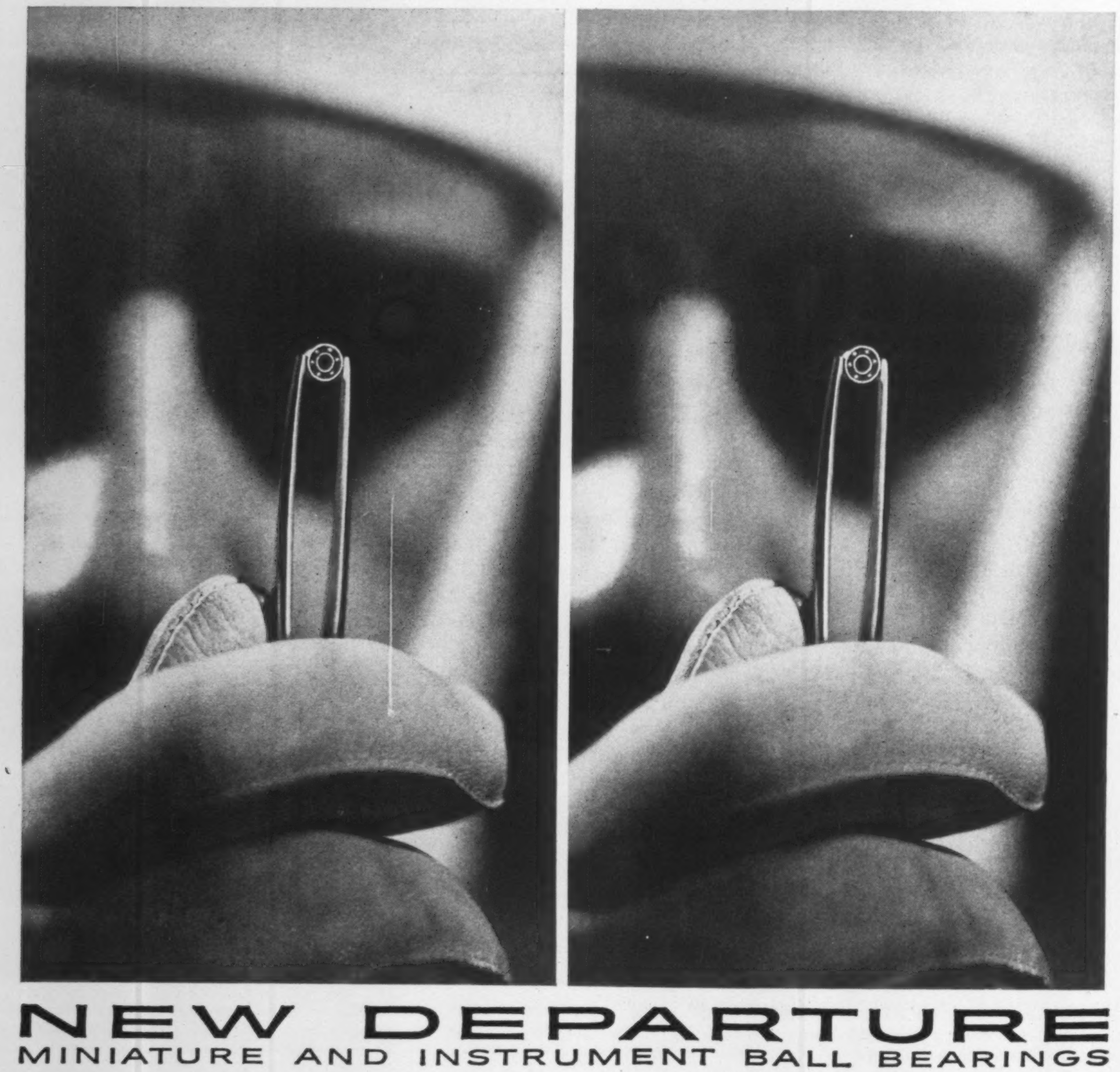
New Departure ABEC 3* and ABEC 5* miniature ball bearings now offer manufacturers of precision miniature potentiometers, gear trains, motors and similar precision products the opportunity to reduce bearing costs substantially.

New Departure ABEC 3 and ABEC 5 bearings can be used wherever the high precision and performance of ABEC 7 bearings are not required. They offer the engineer greater design versatility—he can select the most economical bearing for each application. Moreover, New Departure ABEC 3 miniature ball bearings can be used to upgrade products presently using precision sleeve bearings.

New Departure will continue to offer super precision ABEC 7 miniature ball bearings for your highly critical applications.

If you are planning a re-evaluation of your miniature bearing applications, it will pay you to consult the N/D Sales Engineer in your area. His assistance may help pave the way to reduced parts cost or enhance the quality of your product. For more information, write for booklet AST, NEW DEPARTURE, DIVISION OF GENERAL MOTORS CORPORATION, BRISTOL, CONN.

*Bearing tolerances as established by the Annular Bearing Engineers Committee of the Anti-Friction Bearing Manufacturers Assoc.



NEW DEPARTURE

MINIATURE AND INSTRUMENT BALL BEARINGS

Bearing Spindles Use Air

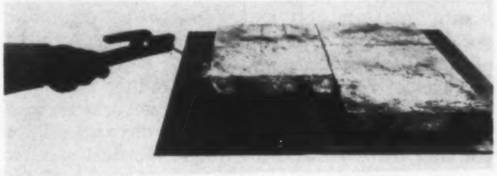
Externally-pressurized air-bearing spindles are accurate to within ±0.000001 in. (For comparison, this page is about 0.002-in. thick.) Both radial and axial runouts are held to a millionth. The spindles use "annular capillaries" to control fluid flow through a bearing. This eliminates the need for conventional pads and orifices. Air consumption is about 2 cfpm at 170 psi. The new spindles can be operated in any position.

More Accurate Gaging?

Thickness gages, pH meters and nuclear-gaging systems may soon incorporate a new electronic device. The newcomer is so sensitive it can detect an electrical charge of a fraction of a picoampere (10^{-12}). It uses a high-gain direct-current feedback amplifier with high input impedance. A heat-sensitive oven houses all critical components. The oven is a must to maintain stability and freedom from ambient effects.

Weld-in-Place Refractory

Designed to be welded into place, a fusion-cast refractory reduces installation costs. Every one of the cast shapes contains a partially exposed steel lug. This lug is arc-welded directly to the shell or structure which is being protected against corrosion or abrasion. Relief areas on the face of each shape insure flush mounting. Interlocking crystals in each cast-to-shape refractory yield superior abrasion-resistant properties.



STEEL LUG: Anchors shaped refractory.

Aluminum Armor Rolls Along

Volume production of aluminum plate for combat vehicles is now under way. Pentagon officials report the vehicles involved include: The T-114 armored reconnaissance carrier; the T-195 self-propelled light howitzer; and the T-196 self-propelled medium howitzer. The T-114 is air-transportable and amphibious. Its hull uses about 6000 lb of aluminum armor plate. The T-195 and T-196 each require 18,000 lb of aluminum armor.

Surface Films Under Study

Behavior of materials with various surface coatings is the subject of a new research study. It's a joint effort by the Ordnance Corps and a major industrial lab. Both corrosion-prevention data and new insights into the strength of coated materials are expected to result. Preliminary investigations into atomic-sized defects show promise of major breakthroughs in combating molecular dislocations. Rebinder effects are underway.

Guards Against Friction

Fluoride can be used as an anti-friction coating on bearings. Thin surface films of pure calcium fluoride on ball and roller bearings reduce friction coefficients to 0.06 at 1500°F. Engineers at NASA's Lewis Research Center report: "For lubrication at temperatures below 1500°F, 25 pct of a ceramic binder should be mixed with the fluoride. This makes the mixture more adhesive."

Protects Rolling Mill

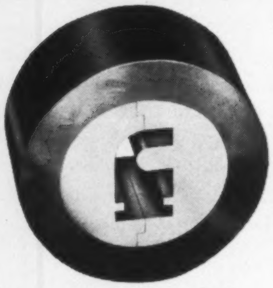
Neoprene-coated fiber glass teams up with aluminum support guides to protect the horizontal screw on a Japanese rolling mill. This neoprene-to-aluminum boot opens to 96 in. When closed, it's only 8-in. long. Locking lugs, which are integral parts of the aluminum rings, serve as anchoring points. At temperatures to 220°F, the expandable boot resists dust, oil and hot scale.

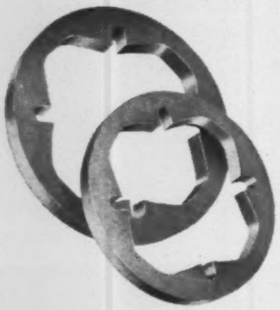
Cast Iron Fuses to Steel

Brake drums made by a process that combines the advantages of steel and cast iron are gaining attention from truck makers. Steel bands are placed on the outside contours of the drums. Then flux and a metered amount of powdered iron is put into the band areas. The entire assembly enters a spinning oven. Centrifugal force fuses the cast iron to the outer steel shells.

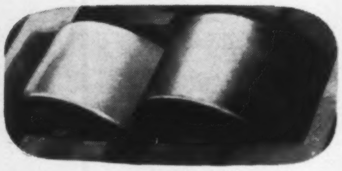
let's evaluate our carbides in terms of your needs

1. SHOT BLAST BLADES


2. COMPACTING DIE


3. SLITTER RINGS

4. NOZZLES


5. CRUSHER ROLLS

Ways to improve operations and save many dollars for your company may be found in a discussion with a Kennametal Carbide Engineer. He is specially trained in carbides—and *devotes his time exclusively* to applying Kennametal* hard carbides in metalworking tools and for making machine components that normally wear out rapidly.

Kennametal hard carbides are the answer to a wide range of applications where resistance to abrasion and wear is a major factor as they last up to 100 times longer than hardened steel. Other outstanding properties are resistance to corrosion; high hardness; high torsional, compressive, and tensile strengths; and high rigidity—three times that of steel.

Some interesting applications are:

1 Kennametal shot blast blades, whirling highly abrasive grit, had about 40% life remaining after 5,189 hours. Steel blades lasted an average of only 140 hours.

2 Compacting die of Kennametal, used to produce ceramic components for electrical equipment, showed no signs of undercutting from abrasion after turning out 1,000,000 pieces.

3 When a can manufacturer replaced steel slitter rings with rings of Kennametal, sheet stock was slit to accurate size without burrs; production was increased to 500-700 cans per minute, and down time was reduced.

4 Kennametal hard carbide nozzles, used in spraying sealing material on can lids, outlast stainless steel nozzles 18 to 1 and reduce rejects by permitting use of higher pressures.

5 Crusher rolls of Kennametal reduce extremely hard abrasive material from ¼-inch mesh particles to 200-230 mesh—averaging a full year of five days a week, 16 hours per day, between roll dressings. Hardest steel rolls required resurfacing every few hours and had to be replaced every several days.

Kennametal properties such as these, plus our creative research and development activities, are helping to translate ideas into vital machine components to provide longer life and improve production in many industries.

For further information, call your nearest Kennametal Representative—or write for Booklet 666, "Proven Uses of Kennametal and Kentanium," which describes over 80 successful applications of these hard carbide alloys. KENNAMETAL INC., Dept. IA, Latrobe, Pa.

*Trademark

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INDUSTRY AND
KENNAMETAL
...Partners in Progress

LETTERS FROM READERS

Not-So-Big Steel

In his Sept. 21 editorial, Editor-in-Chief Tom Campbell reflected on how the smaller steel companies might have responded to Mr. Kennedy's request that the industry hold the present price level.

While the profit pinch hurts the larger companies, he pointed out, it squeezes the smaller companies even more. The final result, he suggested, might be that some companies will be low-priced out of the market.

Here's some of the response to that editorial.—Ed.

Sir—As one of the "not-so-big" steel companies, we wish to thank you for bringing to light the situation of ourselves and others who are in this same category. We can well attest to the fact that the situation is every bit as serious as you portray.

Also, your special report in the same issue (President's Action, Auto Terms, Spell Trouble in Steel Labor) again focuses on a situation that contains further hazards for our group as well as the entire steel industry. We would appreciate receiving copies of the article and the editorial.

May we extend our thanks to you for stating our case so admirably.—Robert M. Sandberg, vice president, Columbia Tool Steel Co., Chicago Heights, Ill.

Another reader, Morton C. Hull, sent a copy of the editorial to the White House with this letter:

Dear Mr. President: You fret about price fixing and monopoly. Such "basket" treatment by labor and government (see attached editorial) has and will continue to force the little companies to the wall and make the big ones bigger. Why not let the customer set the price in a free competitive market?

Alcoa's recent reduction of aluminum prices, dictated by competition and the law of supply and demand, will be far more effective and democratic than executive edict in restraining inflation, wages, and all metal prices, including steel.—Morton C. Hull, Ontario, Calif.

Sir—I think you rendered a fine service to the not-so-big steel companies and the whole industry with this editorial.

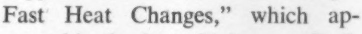
It will be read by men in important positions in high levels of the government. It should cause them to ponder a bit on some of the things which are going on which may well be damaging to business.

The letter you wrote in the editorial was one which individual companies could not do nearly as effectively as you have done.—Don Heaton, Don Heaton Associates, Chicago.

Prism Gaging

Sir—Will you please send us a copy of the article, "Prism Gages Fast Heat Changes," which appeared in the Sept. 21 issue.—C. C. Mathias, refractory metals engineering, Westinghouse Electric Corp.

- **Reprints have been sent.—Ed.**



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Regardless of the size, head style, material or finish of the standard fasteners needed for profitable assembly in your plant, Southern carries them in stock. This means that your order, large or small, can be on its way to you within hours after it is received, if you request rush service.

You are the reason we are up to our ears in fasteners! We're ready—today—to fill your order with USA-made Southern fasteners. Write direct to Southern Screw Company, P. O. Box 1360, Statesville, North Carolina for our current Stock List, or see your local Southern distributor.

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Warehouses: New York • Chicago • Dallas • Los Angeles

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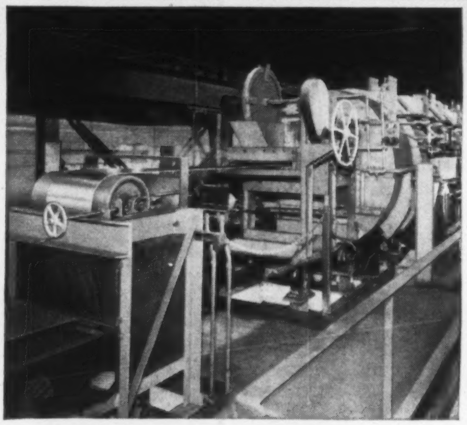

EF Furnace *Bright Annealing Stainless Strip* at Armco Steel

• The No. 18, 24″ wide Stainless Strip Bright Annealing Line at Armco's Butler, Penna. Works, pictured above, is one of 25 coating, silicon and bright annealing lines, designed and built by The Electric Furnace Co., installed in various Armco plants. Like several other EF horizontal bright annealing lines, the furnace and cooling sections are mounted on a balcony. This permits the pay-off reel, coiling reel and control equipment to be installed under the furnace, saving floor space and minimizing building changes.

EF Stainless Strip Bright Annealing Furnaces produce a durable, mirror finish on trim stock and other stainless strip *without chrome depletion*. The Electric Furnace Co. has designed and built *23 stainless strip bright annealing lines;* this is more than any other manufacturer. Included are both horizontal and vertical type furnaces, fuel fired and electrically heated.

For the highest finish, the most durable corrosion resistant surface, and the most experience in bright annealing stainless strip, you too will find that "it pays to call the EF furnace engineers".

THE ELECTRIC EF FURNACE CO.
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THE ELECTRIC FURNACE CO.

Fuel Fired and Electrically Heated
HEAT TREATING FURNACES
for Processing any Product, in any Atmosphere, any Hourly Output Required

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SUBSIDIARIES—Turnkey Engineering Co., Inc., South Gate, Cal. • Canefco Limited, Scarborough, Ontario
SALES REPRESENTATIVES—2842 West Grand Blvd., Detroit 2, Mich. • also 968 Coleman Rd., Cheshire, Conn.

FATIGUE CRACKS

Forming Ideas

Explosive forming, magnetic forming, gas forming—not too long ago these processes were at best laboratory curiosities. Now, for a whole host of good reasons, they're moving out onto the production floor.

Tough-to-form metals and the need for large complex shapes are posing new challenges to fabricators. Parts must be formed with greater precision, and closer to finished size than ever before.

Tech Explosion—It's all part of the technological explosion taking place throughout many areas of metalworking.

As editors, we feel it's a basic part of our job to keep management abreast of the very latest that's happening in metalworking technology. To catch up with them "tomorrow" may not be soon enough.

Added to the "way out" processes, conventional forming techniques are also aiming at key roles in tomorrow's metalworking industry.

Processes Compete—Competition among them is growing. Metals are now being rolled, forged, swaged and extruded to sizes and shapes never before achieved.

Because of the importance of these new trends to metalworking management, the editors have chosen Forming as the latest subject in our new full-color series, Metalworking's Technological Explosion.

Depth Interviews—Like other articles in the technological explosion series, this week's feature on p. 165 is based on thorough interviews with committee members of the Materials Advisory Board.

And like the earlier full-color series articles on materials and steelmaking, the job was done by metallurgical editor, C. L. Kobrin.

Show Features—It's our big feature for this week's special Metal Show Issue and we hope you like it. Other features you will want to check are: Previews of new products exhibited, p. 175; ASM technical program, p. 181; and the alphabetical list of Metal Show exhibitors, p. 191.

Bamboo Curtain

Here's the latest word on automation from behind the bamboo curtain. Automatic assembly lines made mostly of wood and bamboo are replacing hand operations in Red China.

One of the wooden automatics serves in a tea processing plant. It has already relieved more than 2000 manual workers. The Chinese report such automatic lines are easily set up and require low power for running.

What Happened?—Our automation editor, W. N. Redstreake wonders what has happened to the displaced workers. Are they filling the gap in slave labor camps?

We don't know either. But we do know it's Bill's job to make sure there are no gaps in our coverage of the growing trends in automation in metalworking.

It's a new assignment for him on our technical staff and one which will keep him moving through the world of computers, controls and instruments that make up the changing map of metalworking.

Man's World?

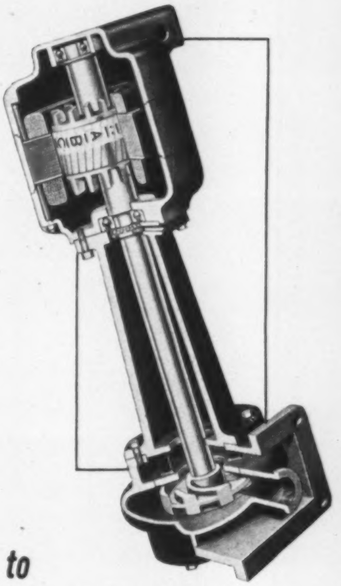
The slide-rule world of space research no longer belongs exclusively to men.

According to the Lockheed Missiles & Space Co., women are an important part of that industry.

In Lockheed's once totally masculine digital computing center there are now 102 women on the day shift alone—one woman for every three men. In the flight sciences section there are 61 females, about one-sixth of the entire staff.

Gusher

Coolant Pumps are PRECISION BUILT



to
- LAST LONGER
- PERFORM BETTER

ON YOUR MACHINES

You get better performance from your GUSHER Coolant Pumps because they are precision built. The one piece shaft in GUSHER Pumps is electronically balanced to cut vibration to a minimum. Ball bearings are pre-lubricated, no seal or packing needed. Write for catalog.

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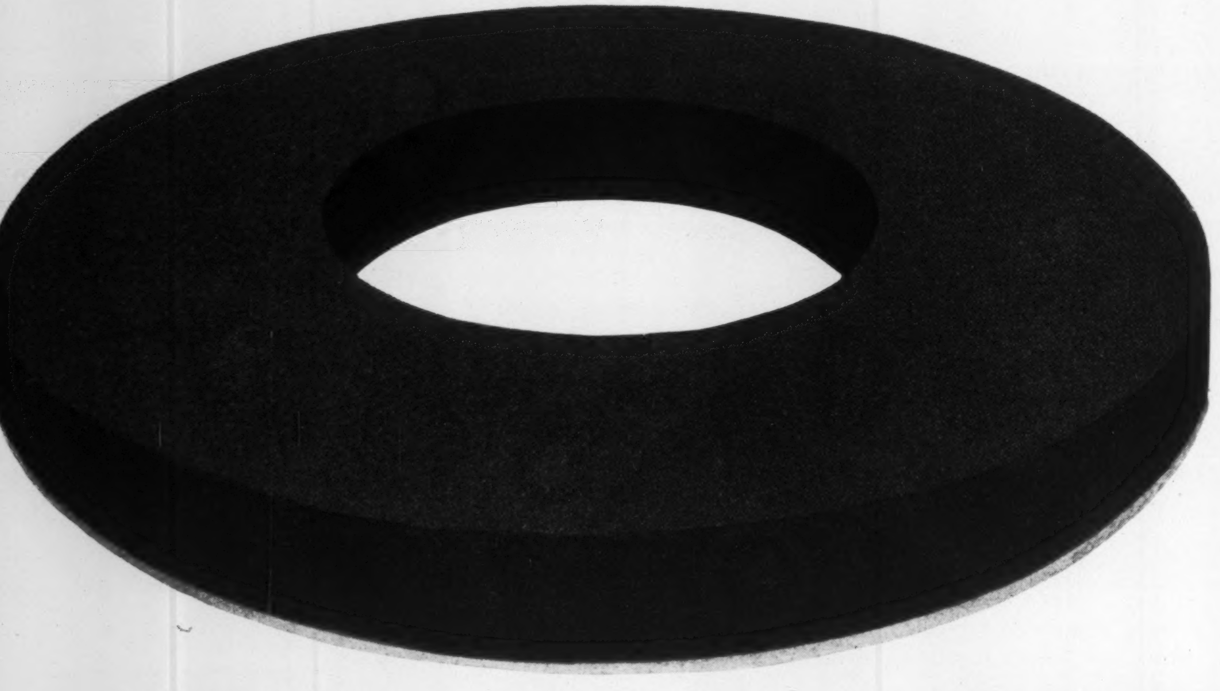
4,245,302 BEARING ROLLERS GROUND ON ONE PAIR OF DISCS

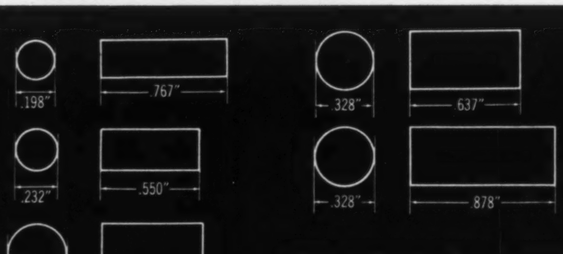


more parts per disc **lower unit costs**

production data

part	roller bearing .328″ x .570″
machine	Gardner 2H20 Double Spindle Precision Disc Grinder
production	9,350 parts per hour
stock removal	.017″-.020″
flatness	.0002″
parallelism	.0002″ or less
uniformity	.0005″
squareness	.0002″ or less
finish	10-15 RMS

Check with your Gardner Abrasive Specialist to see how performance like this can lower your disc grinding costs.



these roller bearings ground on one pair of Gardner discs

GARDNER

GARDNER MACHINE COMPANY, BELOIT, WISCONSIN

COMING EXHIBITS

Fleet Maintenance Exposition—Oct. 23-26, New York Coliseum.

Metal Show — Oct. 23-27, Cobo Hall, Detroit. American Society for Metals.

Packaging Machinery Show—Nov. 7-10, Cobo Hall, Detroit. (Packaging Machinery Mfrs. Institute, 342 Madison Ave., New York 17.)

Marine Supplies & Equipment Show—Nov. 15-17, Hotel Roosevelt, New York City.

MEETINGS

OCTOBER

Assn. of Analytical Chemists—9th Detroit Anachem conference, Oct. 16-18, McGregor Memorial Conference Center, Wayne State University.

American Society of Lubrication Engineers — Conference, Oct. 17-19, Hotel Morrison, Chicago. Society headquarters, 5 North Wabash Ave., Chicago.

Gray Iron Founders' Society—33rd Annual meeting, Oct. 18-20, Royal York Hotel, Toronto. Society headquarters, 930 National City-E 6th Bldg., Cleveland.

National Assn. of Secondary Material Industries, Inc. — Fall meeting, Oct. 18-22, Atlantic Div., Shelburne Hotel, Atlantic City, N. J. Assn. offices, 271 Madison Ave., New York 16, N. Y.

National Conference on Industrial Hydraulics — 17th annual conference, Oct. 19-20, Sherman Hotel, Chicago.

American Society for Quality Control — 16th Midwest conference, Oct. 19 - 20, Chase-Park Plaza Hotel, St. Louis.

Foundry Equipment Manufacturers Assn., Inc. — Meeting, Oct. 19-21, The Greenbrier, White Sulphur Springs, W. Va. Assn. headquarters, No. 1, Thomas Circle, Washington 5, D. C.

(Continued on P. 24)

"Call FOSTER for pipe PLUS"

When you order pipe from Foster you get several big "pluses" in service and savings.

First, Foster warehouses always stock the exact pipe you want, in any quantities—lengths or carloads.

Second, you get big savings as a result of lowest possible material costs through single-source buying, combination shipments, and lower freight rates from Foster's strategically located warehouses.

Third, delivery is always "Faster From Foster."

Foster's nationwide warehouses carry complete stocks of every standard item of Tested Pressure Pipe 1/8" thru 42", including hard-to-get Large OD's, Heavy Walls, and Seamless Carbon Pressure Pipe. We can also supply a complete range of Valves, Fittings and Flanges.

And for unusual savings, check Foster Structural Pipe 1/2" thru 60". It's ideal for hundreds of non-pressure uses, foundation piling and limited service lines.

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Pittsburgh 30, New York 7, Chicago 4, Houston 2,
Los Angeles 5, Atlanta 8, Cleveland 35.

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3-DIMENSIONAL METALLURGICAL TEAMS:

Republic's mill, field, and laboratory metallurgists and machining experts help you select and apply the metal best suited to requirements. Mail coupon for details on this confidential, obligation-free service.

KAMAN AIRCRAFT CORPORATION, Bloomfield, Connecticut, uses Republic Titanium in the rotor system of their HU2K "SEASPRITE" Helicopter. 1½" x 18" titanium (type RS140) strips are assembled in bundles of 88 and machined into retention straps capable of working through a torsion angle of ±13°. Each strap provides a minimum tensile strength of 155,000 psi.

SEE OUR EXHIBIT AT THE
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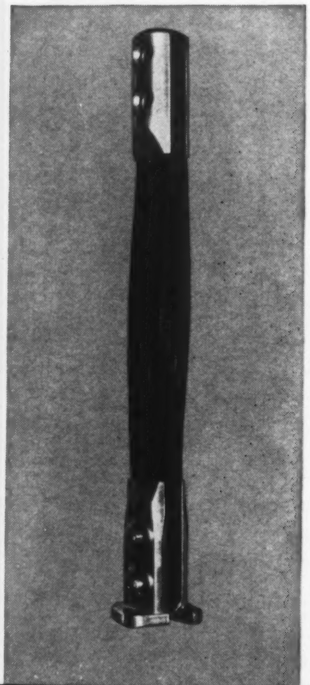
DETROIT METAL SHOW
OCT. 23-27
THE EXPOSITION OF MATERIALS & PROCESS ENGINEERING



MORE STRENGTH, MORE VALUE, MORE MILES

Why Republic Alloy Steel Is specified for critical transmission components

One good example is the alloy steel planetary ring gear above. Produced by the Warner Gear Division of Borg-Warner Corporation, Muncie, Indiana, this part must withstand severe shock, strain, impact, and wear.

Republic Hot Rolled Alloy Steel, Type 4047, was selected to assure strength and toughness with the best possible degree of machinability. The alloy is forged, rough machined, broached, hobbed, and heat treated. Uniform response to heat treatment provides hard surfaces around tough cores, and assures maximum resistance to abrasion, friction, and wear.

Records prove that the uniformity of this alloy steel has reduced reject rate and scrap loss. This, along with the high machinability, is holding unit cost of the planetary ring gear to an absolute minimum.

Our metallurgists will help you select and apply the most economical alloy steel capable of meeting your requirements. For information, contact your nearest Republic sales office or mail the coupon below. Please indicate if you would like a metallurgist to call.

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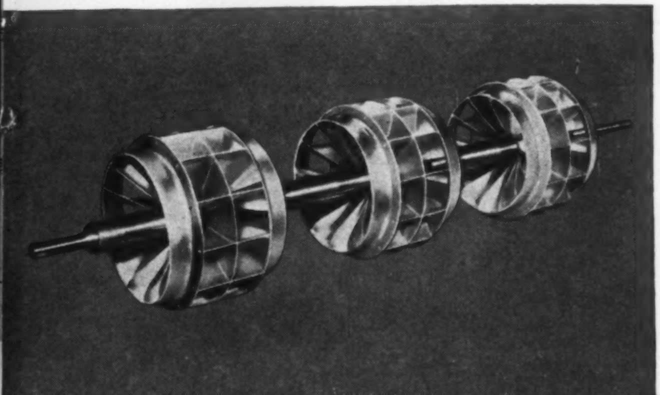
Republic Has The Feel For Modern Steel

BUFFALO FORGE COMPANY uses Republic ELECTRUNITE® Mechanical Tubing in the production of rotor shafts that require exact balance to maintain high operating efficiency. Up to 94″ in length, these shafts turn at 1110 rpm. Close tolerance concentricity of ELECTRUNITE meets requirements without costly machining. Available in carbon and stainless steel. Mail coupon for details.



REPUBLIC STEEL CORPORATION
DEPT. IA- 1591-B
1441 REPUBLIC BUILDING • CLEVELAND 1, OHIO

Please send more information on:
- ☐ Republic Alloy Steel
- ☐ ELECTRUNITE Mechanical Tubing
- ☐ Titanium

Have a metallurgist call:
- ☐ Republic Alloy Steel
- ☐ Titanium

Name____________________Title__________
Company______________________________
Address______________________________
City________________Zone____State______

MELTING SUPT. reports:

Soffel's

EXOTHERMIC SIDEBOARDS

eliminate Hot Tops . . .
are easy to handle . . .
reduce stripping time
to a minimum
and give more
"out the door" products

Use Soffel's
EXOTHERMIC
SIDEBOARDS
in
BIG END
DOWN MOLDS

Experience proves Soffel's Exothermic Sideboards increase yield all along the line. They require *less* set-up time, *less* track time, *less* storage space, *less* mold inventory. No crane is required–a limiting factor in conventional hot topping. Sideboards give you *more* sound steel and *more* flexibility in operations.

PRODUCT ADVANTAGES

- Eliminate permanent and conventional hot tops.
- Easy, and single, stripping of Big End Down molds.
- Sideboards are easily placed in head of mold by one man — crane only necessary on very large ingots.
- Longer mold life — less mold cost — less mold inventory to carry.

Soffel's Exothermic Sideboards increase ingot yield, assure top cut soundness and provide more ton steel out the door per ton of steel in the ingot.

Phone NAtional 5-1571

Pittsburgh Metals Purifying Co.
A Division of Treesdale Laboratories, Inc.
MARS, PENNSYLVANIA

MEETINGS

(Continued from P. 21)

National Society of Professional Engineers—Fall meeting, Oct. 19-21, Hotel Roanoke, Roanoke, Va. Society headquarters, 2029 K Street, N. W., Washington 6, D. C.

Foundry Equipment Manufacturers Assn., Inc. — Meeting, Oct. 19-21, The Greenbrier, White Sulphur Springs, W. Va. Assn. headquarters, No. 1 Thomas Circle, Washington, D. C.

Magnesium Assn. — Annual convention. Oct. 22-24, Belmont Plaza, New York. Assn. headquarters, 122 E. 42nd St., New York.

National Assn. of Sheet Metal Distributors — Annual meeting, Oct. 22-25, Hotel Dennis, Atlantic City, N. J. Assn. headquarters, 1900 Arch St., Phila.

American Coke & Coal Chemical Institute — Annual meeting, Oct. 23-24, The Greenbrier, White Sulphur Springs, W. Va. Institute headquarters, 711 Fourteenth St., N. W., Washington, D. C.

Wire Assn. — Annual convention, Oct. 23-26, French-Lick Sheraton. French Lick, Ind. Assn. headquarters, 453 Main St., Stamford, Conn.

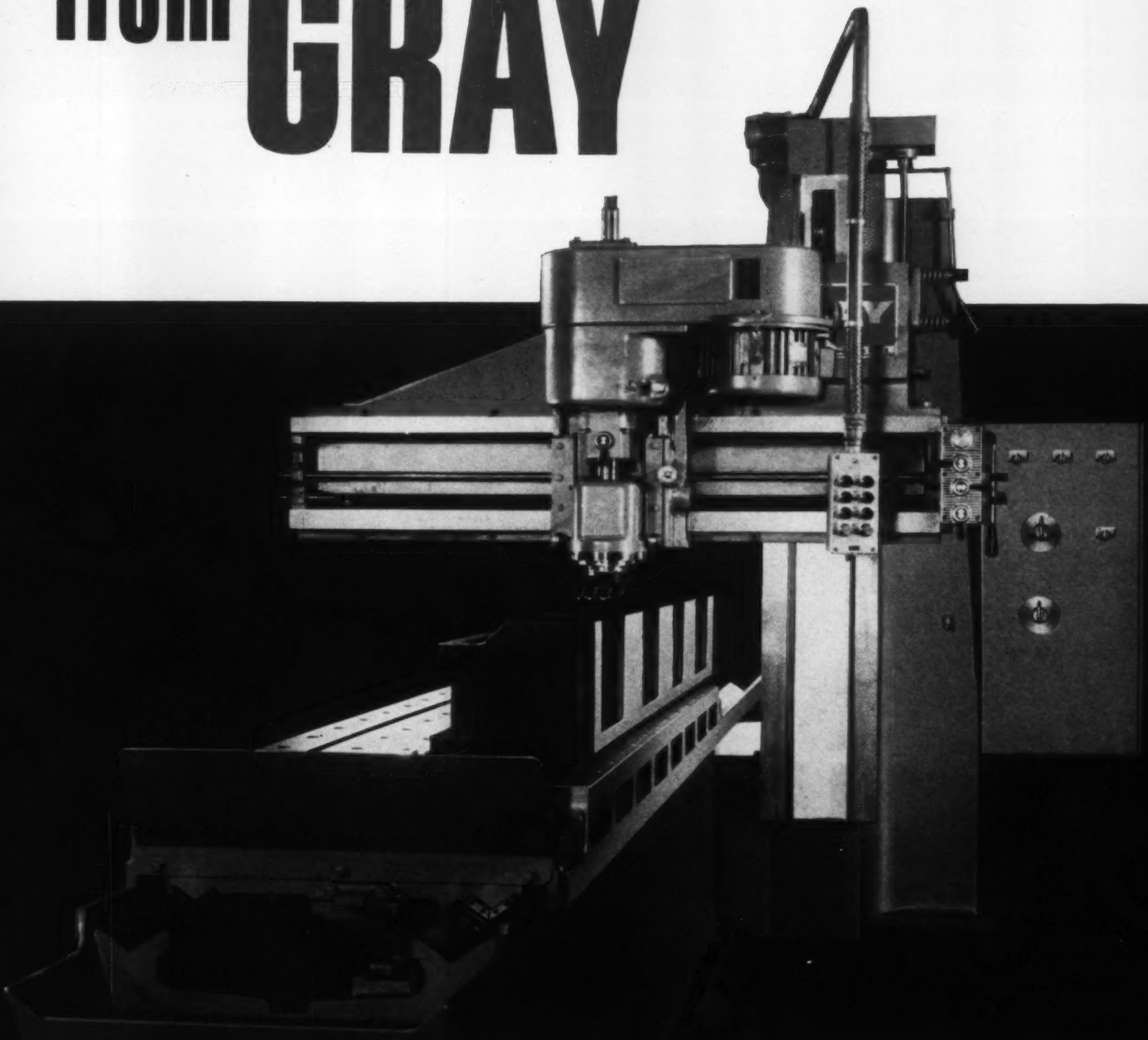
Society for Non-Destructive Testing—National convention, Oct. 23-27, Detroit. Society headquarters, 1109 Himman St., Evanston, Ill.

National Tool & Die Manufacturers Assn. — Annual convention, Oct. 24-28, Huntington-Sheraton Hotel, Pasadena, Calif. Assn. headquarters, 907 Public Square Bldg., Cleveland.

American Society of Tool Engineers — Semi-annual conference, Oct. 26-27, The Royal York Hotel, Toronto. Society headquarters, 10700 Puritan Ave., Detroit.

Industrial Truck Assn. — Annual meeting, Oct. 29-31, The Greenbrier, White Sulphur Springs, W. Va. Assn. headquarters, One Gateway Center, Pittsburgh.

NEW budget class miller from GRAY

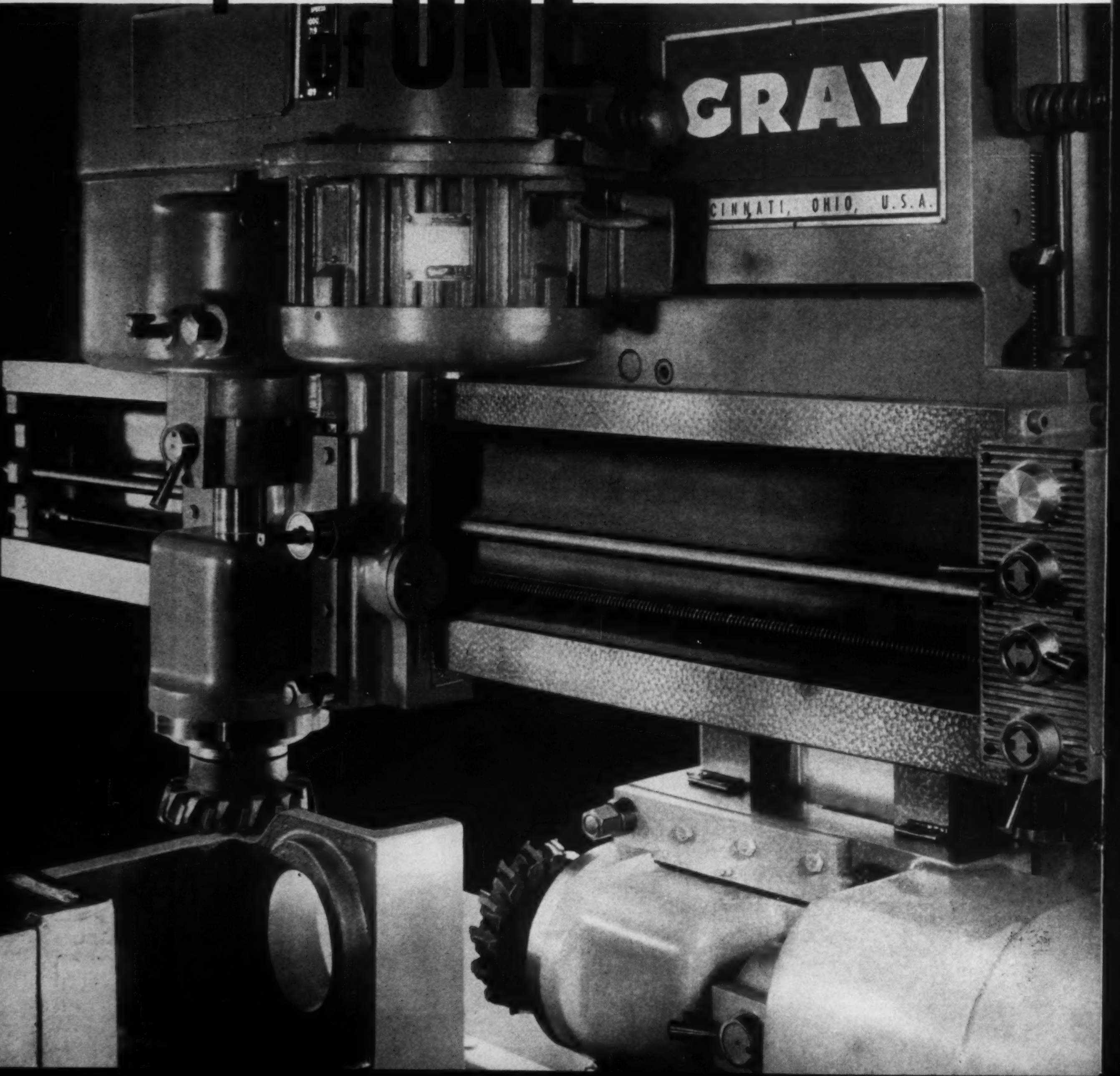


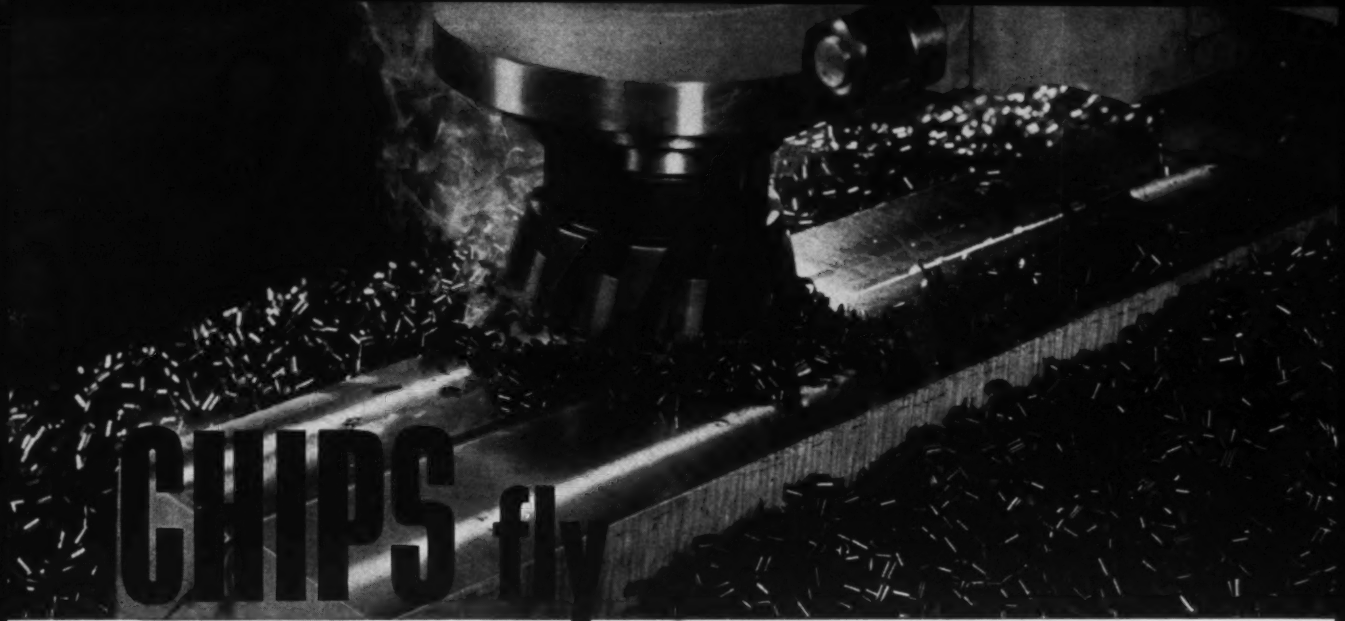
$33,700.00

ONE RAIL HEAD
30″ X 6′ TABLE

TWO heads for less than the price of ONE

Most milling machines built with one spindle, cost more than the new Gray Handymill equipped with two spindles. Why ever consider high priced single spindle machines with fancy controls you don't need, when you can enjoy the low priced, versatile Gray.

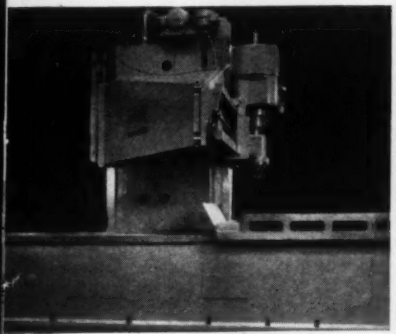


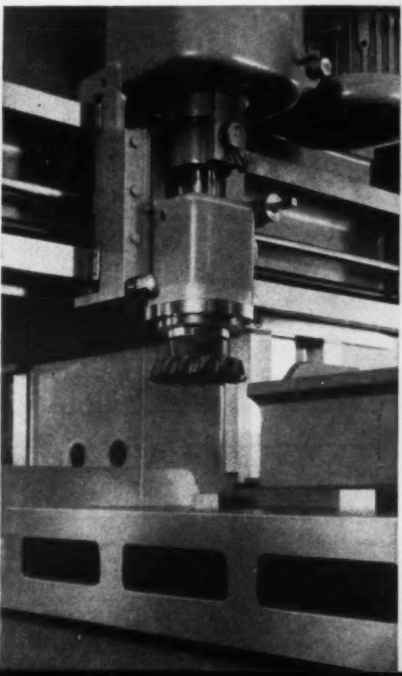


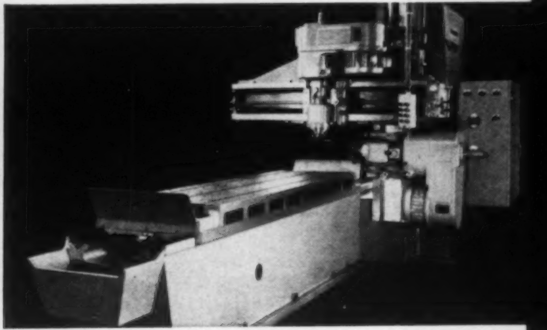
CHIPS fly at the rate of 4½ lbs. per minute

An outstanding performance, proof positive that the Gray Handymill has power to spare. Maximum chip removal, versatility, low burden factor minimum maintenance, all at the fabulously low price of $33,700—(basic machine, one head) makes the Gray Handymill your best investment.

SOLID GRAY CONSTRUCTION THROUGHOUT





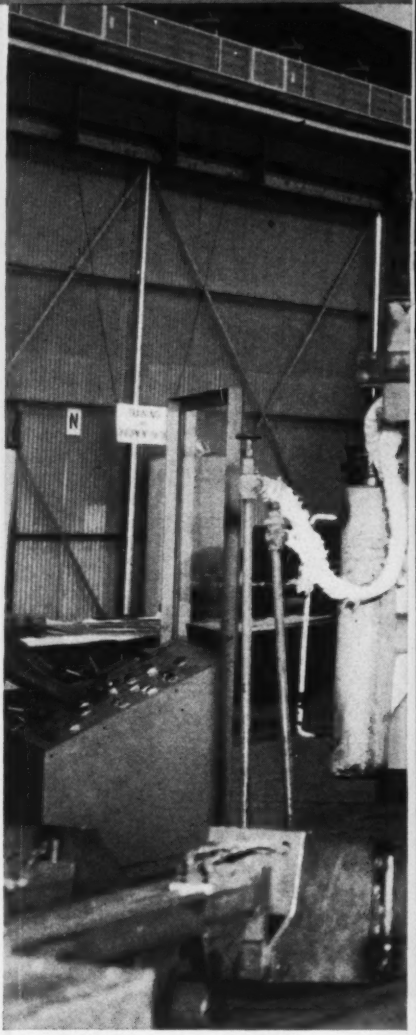


Technical Bulletin No. 77R Available

THE G. A. GRAY CO.
CINCINNATI 7, OHIO

MILLING MACHINES-PLANER TYPE / MILLING PLANERS / PLANERS / HORIZONTAL MILLING, BORING AND DRILLING MACHINES

WARNING
ONLY
CELLULU



Cellulube 220 was chosen for this hydraulic press when it was installed at North American in 1956. At that time it was used for form-die quenching of hot, fully expanded titanium parts at 1000°F.

. . . and since 1959, this same press has been used to form brazed stainless steel "honeycomb" panels for the B-70 bomber. The panels are pressure-quenched at 1700°F. Cellulubes are still safely on the job.

at 1000°F. . . or 1700°F. . . Cellulubes

FM Factory Mutual-Approved
(Cellulubes 150 and 220)

Bureau of Mines—Approved #30-2

CELLULUBE
Celanese
CHEMICALS

Celanese Chemical Company, Dept. 578-5, 522 Fifth Avenue, New York 36, N. Y.

Data on Cellulubes, please!

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Company____________________

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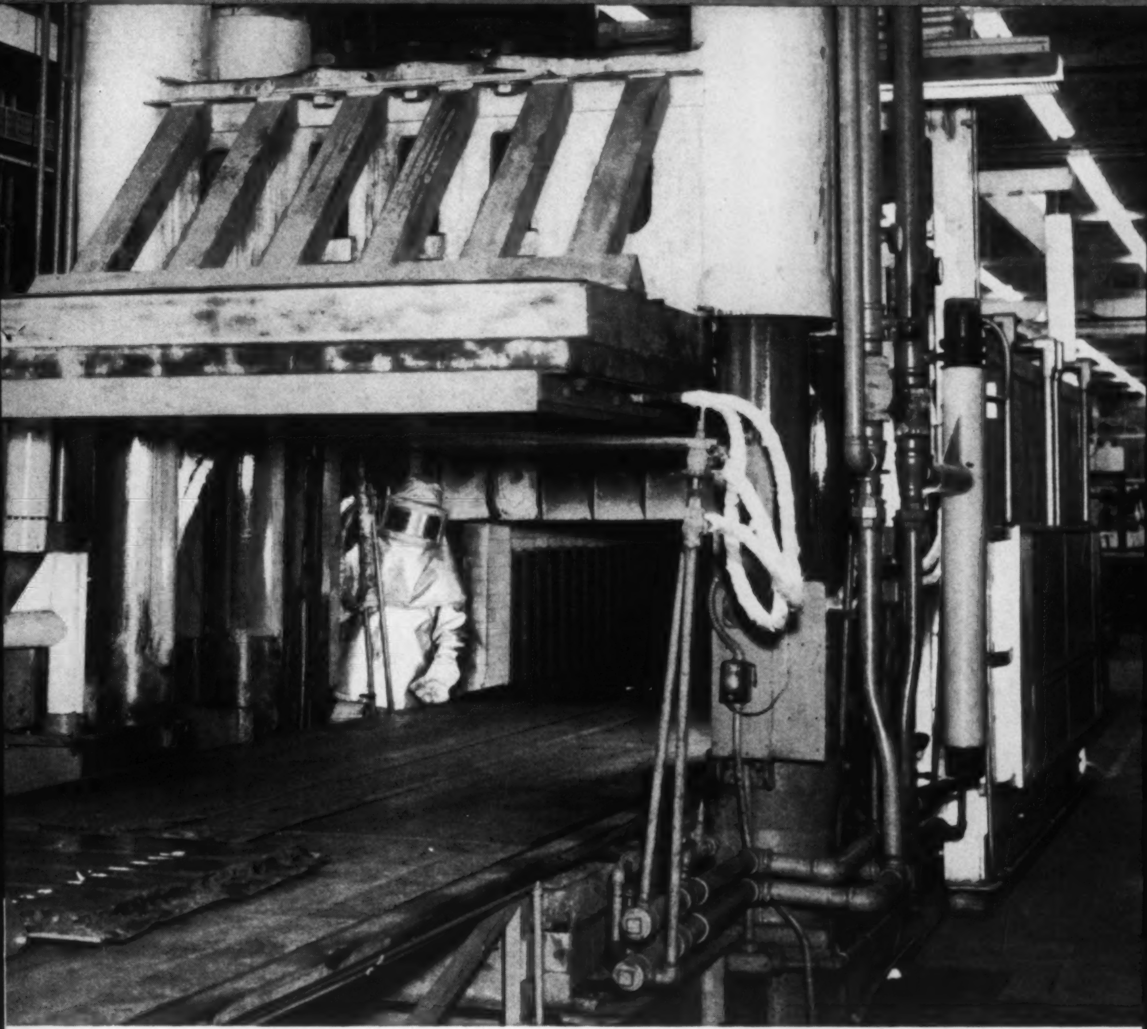
Application I have in mind____________________



guard safety at North American

In high-temperature press-forming operations like these, hydraulic line breaks could be a serious fire hazard. North American Aviation assures maximum protection for personnel and equipment by using Celanese Cellulubes—the *safe* hydraulic fluids. It's the best way to take the worry out of high-temperature production.

Perhaps you should be using Cellulubes, too! In addition to their safety advantages, Cellulubes provide overall protection against wear comparable to that of premium petroleum oils. There are no foaming problems, no additives to deposit in the system. Vapor pressure is extremely low; vapor losses negligible. And Cellulubes come in your choice of six viscosity ranges.

Mail the coupon for details. Celanese Chemical Company, 522 Fifth Avenue, New York 36, New York.

Celanese® Cellulube®

Cellulubes... Celanese fire-resistant functional fluids

CHEMICALS

In Canada: Canadian Chemical Company Limited, 2035 Guy St., Montreal, Toronto, Vancouver
Export Sales: Amcel Co., Inc., and Pan Amcel Co., Inc., 522 Fifth Ave., New York 36

CELANESE CELLULUBES

Standard Forge & Axle Co. forges 5-inch by ½-inch Pittsburgh Seamless Mechanical Tube ends down to 2⅝″ solid steel wheel spindle ends (cross section above). The Montgomery, Ala., plant then machines and grinds bearing surfaces to .0005-inch tolerance to produce single-piece, 20,000 pound capacity trailer axles. Trailer operators benefit from higher payloads because . . .

They Throw Away The Holes—And Save Weight

The trick in making a seamless steel tube is piercing a hole in a round of solid steel.

But Pittsburgh Steel Company's Seamless Steel Mechanical Tubing makes the full circle in production of trailer axles at Standard Forge & Axle Co., Montgomery, Ala.

Standard, in effect, throws away the holes by forging the tube ends down to solid steel again, leaving only a hollow steel center and spindle section.

The result: a lightweight, one-piece trailer axle made entirely from a single length of seamless tube—including load bearing wheel spindles, precision ground for bearing and seal seats.

The advantage: assured strength and safety of seamless steel, plus, for example, reduced axle weight for trailer operators in a 20,000 pound capacity axle.

Starting with a seamless steel tube 5″ x ½″ x 87⅞″ for this particular axle, Standard upsets both ends, then swages them down to the shape of a spindle with a 2⅝″ solid end.

That's deformation of the roughest kind.

But Pittsburgh Seamless Mechanical Tubing takes it in stride, then bounces back under heat treatment with the physical properties required for precision finishing of the critical spindle surfaces, and the toughness necessary for a long life in hard service.

And that kind of performance takes seamless steel tubes with exceptional internal soundness, consistent grain structure, and chemical and dimensional uniformity.

Pittsburgh C-1040 grade Seamless Mechanical Tubing supplies these properties consistently—for this type

After upset, Pittsburgh Seamless Mechanical Tubes, with 5-inch OD and ½-inch wall, are swaged to solid steel spindle shape on drop forge, at right. Standard's heat treating process refines grain, restores toughness of steel.

20
St
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D

Standard also produces high-strength inserted spindle trailer axle by inserting forged alloy steel spindle with 4.065-inch OD into 4.040-inch burnished ID of 5-inch seamless steel tube under 50,000-pounds pressure.

Standard Forge & Axle Sales Manager James A. Rumbley says Pittsburgh Steel Company, as longtime major supplier of seamless mechanical tubes, "leaves nothing to be desired in product or service."

axle and for Standard's high-strength inserted spindle type.

James A. Rumbley, Standard's sales manager, says:

"Trailer axles are high-weight carrying members subject to tremendous load shocks. So we use the finest materials available to assure our customers trouble-free service. Seamless steel mechanical tubes help us to do that, with complete safety and at less weight.

"For many years, Pittsburgh Steel Company has been one of our major tubing suppliers. It has left nothing to be desired either in product or service."

That's standard practice with Pittsburgh Steel—whether supplying seamless mechanical tubing to Standard's specific requirements, or to yours. Be certain with Pittsburgh Seamless. Contact one of the district offices listed below.

Pittsburgh Steel Company

Grant Building • Pittsburgh 30, Pa.

DISTRICT SALES OFFICES
Atlanta
Chicago
Cleveland
Dallas
Dayton
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Houston
Los Angeles
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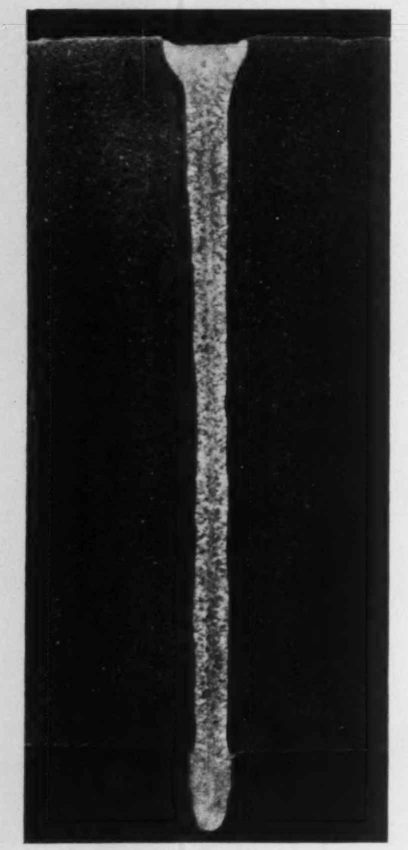
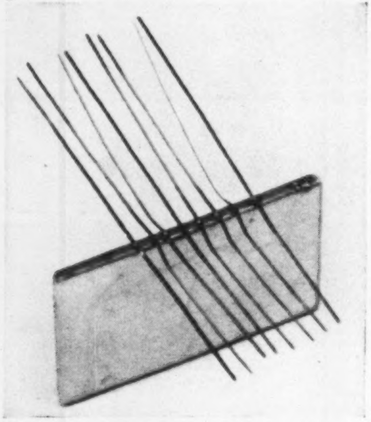
"Impossible" welds

Welds that are impossible by any other technique are now routine with Hamilton-Zeiss' high-energy density electron-beam welding. Hamilton-Zeiss equipment offers you unique performance combined with flexibility, reliability and repeatability / Difficult materials, unequal dimensions and deep penetrations present problems that only Hamilton-Zeiss welding equipment can solve with its high-energy density and precision electron-beam focusing by the exclusive Zeiss magnetic lens system. The Hamilton-Zeiss weld, created in a vacuum, offers these significant advantages: virtual elimination of contamination, close control of penetration, low thermal distortion and close dimensional control. Exhaustive tests demonstrate conclusively that welds produced by the Hamilton-Zeiss method are as strong as the original materials. Supporting metallurgical data are available for your inspection / For full information call Hamilton-Electrona, Inc., exclusive marketing agent for Hamilton-Zeiss equipment in the United States and Canada.



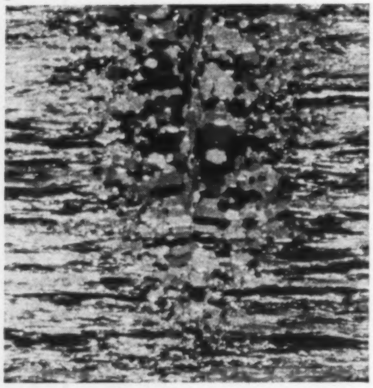
1 / Penetration study of one-inch thick Type 302 stainless steel reveals an amazing depth-to-width ratio. High-energy density and sharp focusing produce this unique weld with no reduction in the original strength of the material.

2



2 / Copper ribbon wires (0.002" x 0.010") welded to the edge of a nickel-plated ceramic substrate. This is just one demonstration of the ability of Hamilton-Zeiss equipment to weld dissimilar materials. Because of the unique design of the Hamilton-Zeiss equipment, electrons travel at approximately 212,000 miles second at the work piece.

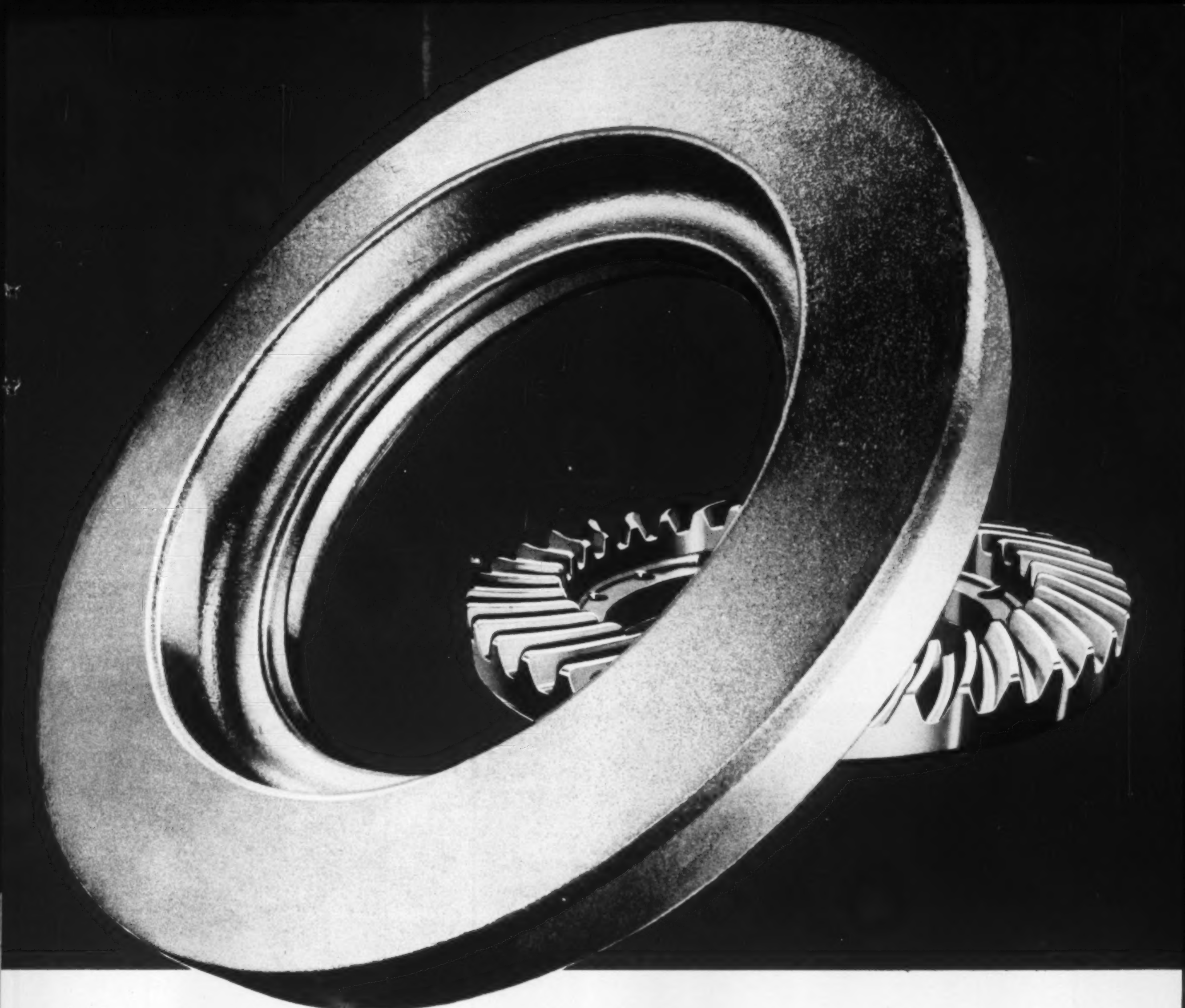
3



3 / Study of weld on 0.100" tungsten shows minimum grain growth and no evidence of contamination. The high-energy density beam minimizes grain growth because welding time is extremely short and heat is applied to an exceptionally small zone. Contaminants are eliminated by welding in a high vacuum without filler; impurities are outgassed during the cycle.

HIGH-ENERGY DENSITY ELECTRON-BEAM WELDING
BY HAMILTON-ELECTRONA, INC. /

TIME-LIFE BUILDING, ROCKEFELLER CENTER
NEW YORK 20, N.Y / PHONE PLAZA 7-9548-9



BEVEL GEARS FORGED A NEW WAY!

Now . . . by our unique combination of specialized Rolling and Drop Forging, Milwaukee Forge offers quality Bevel Gears as you want them . . . when you want them!

Our method will be of interest to you if your requirements fit the following ranges:

Forged Weight . . . . 30 lbs. to 100 lbs.
Inside Diameter . . . . 6″ to 13″
Outside Diameter . . . . 11″ to 18″
Quantity Runs . . . . . 50 to 5000

MF

MILWAUKEE FORGE
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1532 E. Oklahoma Avenue, Milwaukee 7, Wisconsin

They "Go Together" For

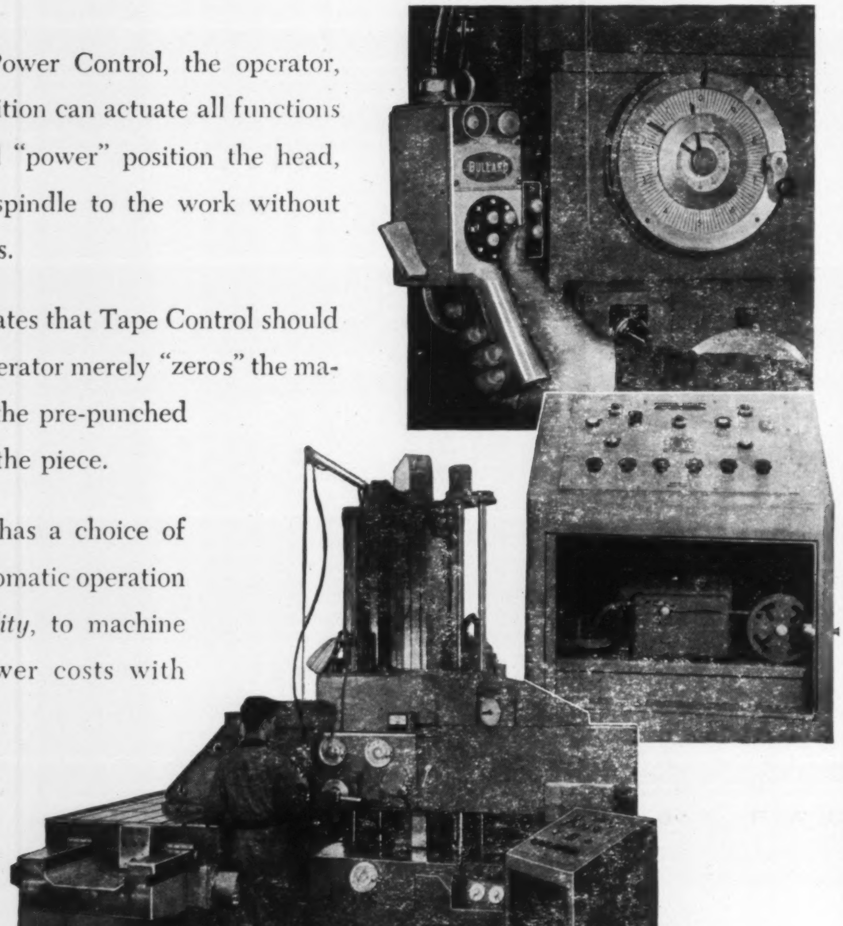
CENTRALIZED POWER CONTROL for manual operation and **NUMERICAL TAPE CONTROL** for automatic operation provide complete versatility of the Bullard DYNAMILL H. B. M. to insure maximum production.

Complete Versatility

With Centralized Power Control, the operator, from his normal position can actuate all functions of the machine and "power" position the head, table, saddle, and spindle to the work without hand cranks or levers.

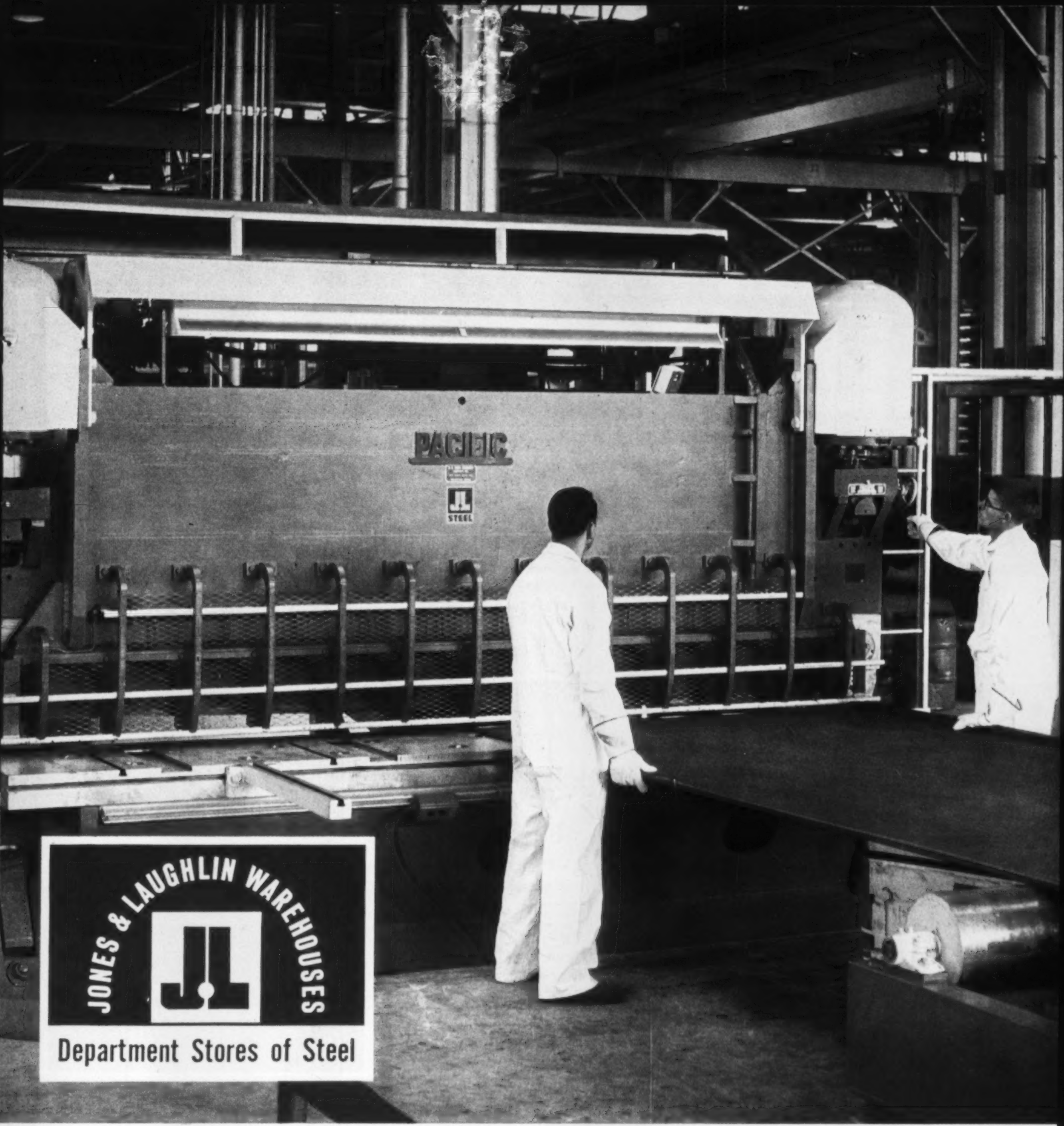
When the work dictates that Tape Control should be employed, the operator merely "zeros" the machine according to the pre-punched tape for machining the piece.

Thus, the operator has a choice of either manual or automatic operation – *complete versatility*, to machine more pieces at lower costs with increased profits.



BULLARD

For Complete Information on the Bullard DYNAMILL H.B.M., call your nearest Bullard Sales Office or Distributor or write The Bullard Company, Bridgeport 9, Connecticut.



J & L Steel Service Centers—efficient and dependable. You name it and you can get it—at the Department Stores of Steel. This massive 12 foot hydraulic shear, for example, cuts plate squarely and accurately up to ¾″ thick . . . to meet your exact specifications. Modern machinery like this, skilled warehousemen trained to give *extra* care to every order, plus ready-to-go stocks of carbon, stainless and specialty steels—all add up to faster, more efficient service for today's J & L customers.

Take advantage of the streamlined, time-saver service J & L offers. Count on the Department Stores of Steel. You'll get exactly what you want—when you want it.

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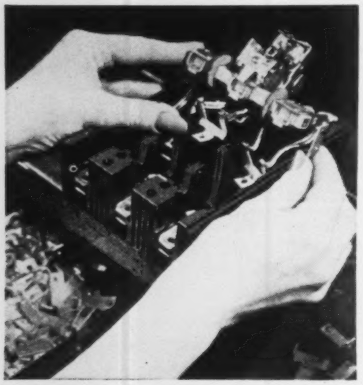
Important facts to know about Laminated Plastics

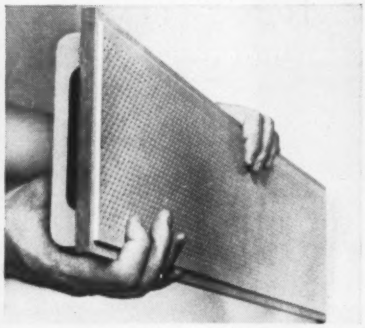
LAMINATED PLASTICS *What they are, where they can be used*

Taylor laminated plastics, also known as reinforced plastics, are thermosetting-type materials formed by impregnating paper, cotton cloth, asbestos, glass cloth, nylon or other base materials with synthetic resins and fusing them into sheets, rods, tubes and special shapes under heat and pressure. These materials exhibit a valuable combination of characteristics, including high electrical insulation resistance, structural strength, strength-to-weight ratio, and resistance to chemical reaction; also adaptability to fabricating operations.

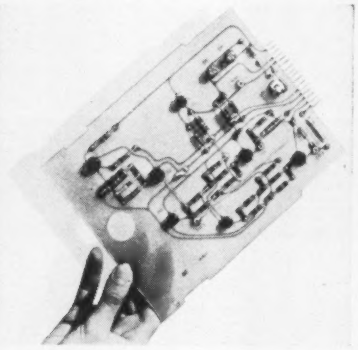
Types of laminated plastics made by Taylor
There are four basic types of Taylor laminated plastics commonly specified and used throughout industry today. They are as follows:



Phenolic Laminates. Paper, cotton fabric or mat, asbestos, glass cloth or nylon bases impregnated with phenol formaldehyde resins. These provide strength and rigidity, dimensional stability, resistance to heat, chemical resistance, and good dielectric characteristics. Some Taylor grades are excellent basic materials for gears, cams, pinions, bearings and other mechanical applications. Others are widely used in terminal boards, switchgear, circuit breakers, switches, electrical appliances and motors. Also in radios, television equipment and other electronic devices; and in missiles as nose cones, exhaust nozzles, and combustion chamber liners.

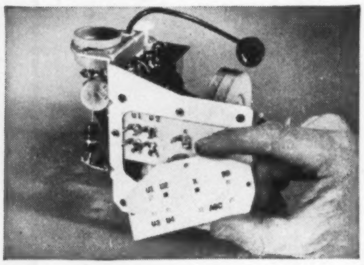


Melamine Laminates. Glass cloth or cotton fabric impregnated with melamine formaldehyde resin. Taylor melamine laminates have superior mechanical strength and are especially desirable for their arc-resistant qualities. Good flame and heat resistance, good resistance to the corrosive effects of alkalis and most other common solvents, besides other favorable characteristics. Typical applications include arc barriers, switchboard panels, and circuit-breaker parts in electrical installations.



Silicone Laminates. Continuous-filament woven glass fabric impregnated with a silicone resin. These laminates combine high heat resistance (up to 500°F. continuous) with excellent electrical and mechanical properties. They are primarily used in high-temperature electrical applications and high-frequency radio equipment.

Epoxy Laminates. Continuous-filament woven glass fabric or paper impregnated with epoxy resin. Glass-fabric grades are designed for use in applications requiring high humidity-resistance, good chemical resistance, and strength retention at elevated temperatures. Paper grades are used under high-humidity conditions where resistance to acids and alkalis is required. Both grades are characterized by good dielectric strength, low dielectric losses, and high insulation resistance even following severe humidity conditions.



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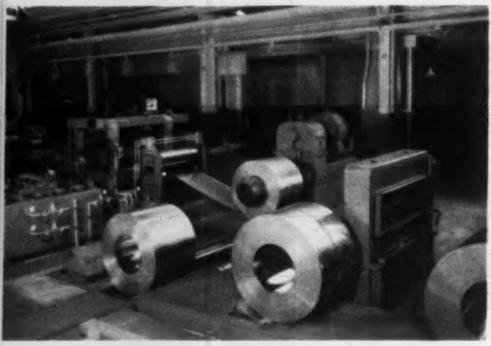
Recent technical advances in the bonding of various metallic and nonmetallic materials to laminated plastics have opened up new design opportunities. It is now possible to bond virtually any compatible material with a laminated plastic to form a composite which combines the advantages of both. One of the first composite materials was a copper-clad laminate used for printed circuits. More recent composite laminates, usually manufactured to customer specification, include the following: Taylorite® vulcanized fibre-clad, rubber-clad, asbestos-clad, aluminum-clad, beryllium-copper-clad, stainless-steel-clad, magnesium-clad, and silver- and gold-clad. Any one of these materials can be sandwiched between sheets of laminates, too, and can be molded to fit specific requirements.

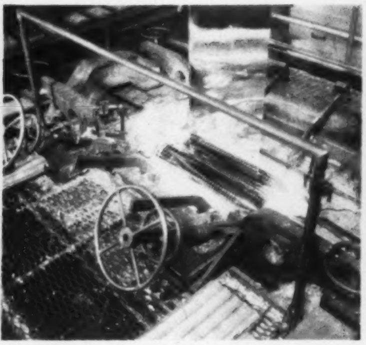
Send for complete information about any or all of these Taylor laminates. And remember Taylor's new selection guide will simplify your problems in choosing the right laminate for your specific application. Taylor Fibre Co., Norristown 52, Pa.

Taylor
LAMINATED PLASTICS VULCANIZED FIBRE

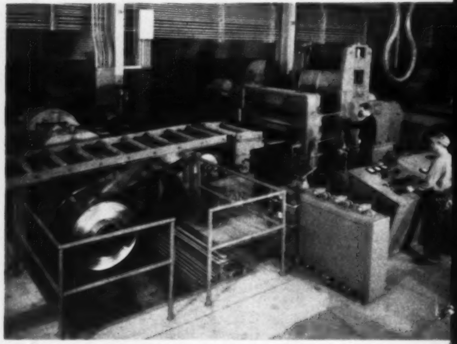
Wean Engineering
built the first
Wheeling-type
galvanizing line...
and the second...
and the third...
and the fourth...
in fact, all such lines
built—and being built—
for the
Steel Industry



Coils are welded and side-trimmed in the entry section for continuous line operation.



Strip emerging from the pot has a uniformly applied coating of zinc.



Galvanized steel is either coiled or sheared-to-length to meet customer requirements.

In 1953,

The Wheeling Process was developed for commercial production

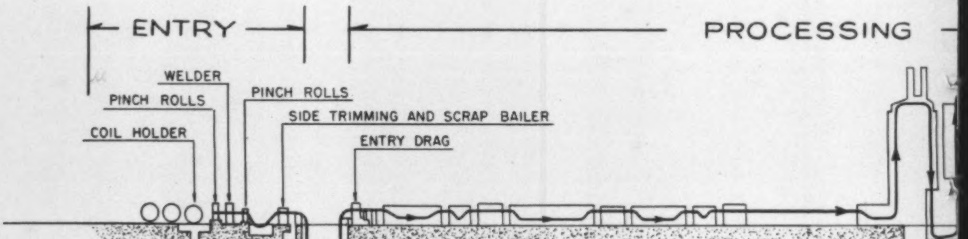
Before Wheeling Steel Corporation started up its No. 1 Continuous Strip Galvanizing Line—the first of its kind—at Martins Ferry in 1953, the firm's research department had spent years in extensive testing of the process, including the operation of a narrow pilot line.

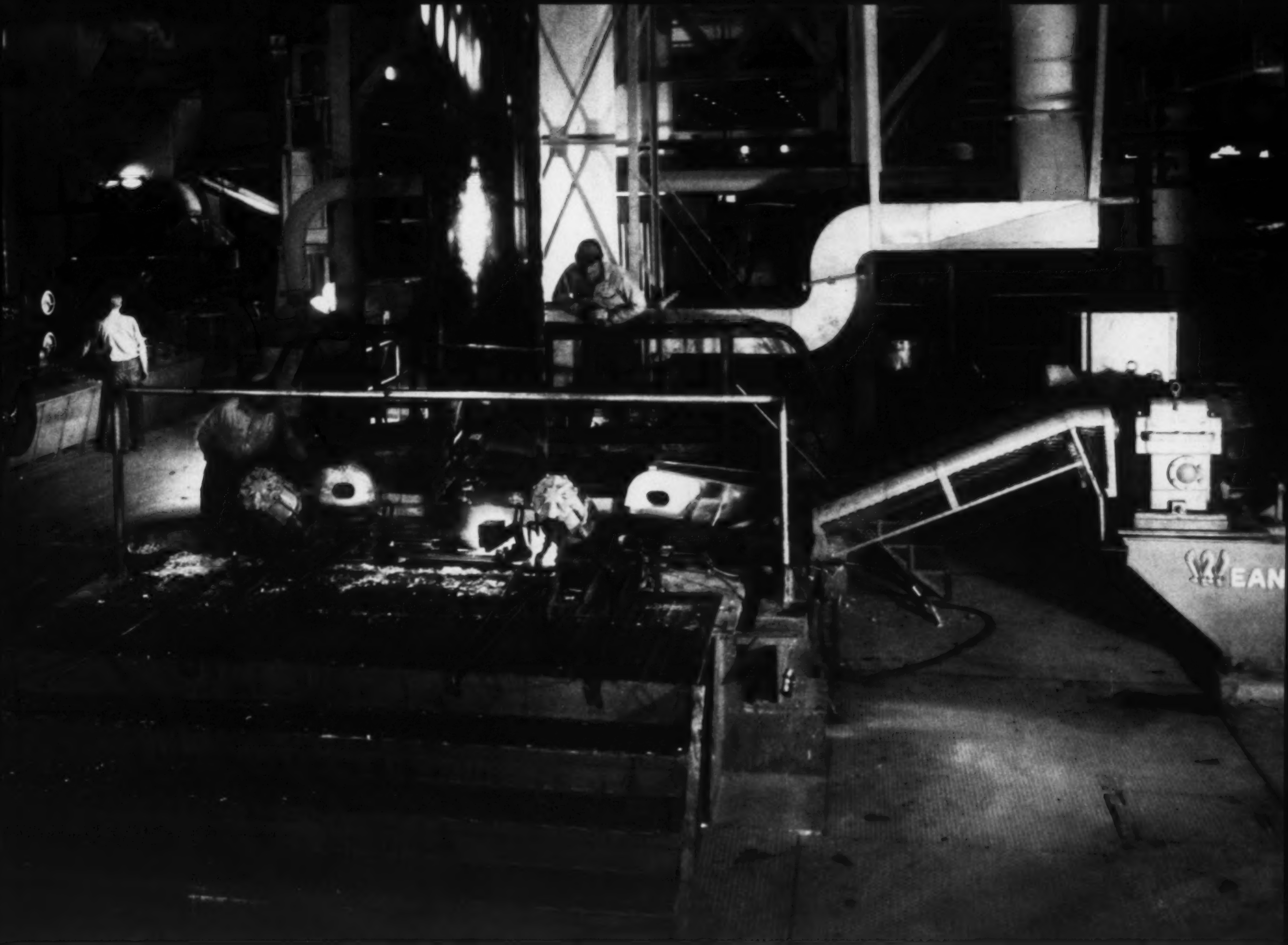
Wheeling's approach was a departure from the galvanizing lines already in production, in that the coils fed into the Wheeling line had already been annealed and temper passed. This meant that the metallurgical properties of the base metal were established before the galvanizing operation, with no adjustments in coating line speed required for various annealing cycles.

As shown below, the Wheeling-type galvanizing line is separated into three sections: entry, processing and exit. As in all continuous strip processing lines, these sections are separated by strip accumulators (either pits or mechanical looping devices).

The entry section's function is to provide a continuous supply of side-trimmed strip to the processing section. In the processing section, the strip is inspected, cleaned and fluxed, then coated with the desired thickness of zinc. After coating, the galvanized strip is chemically treated for whatever type of end product is desired.

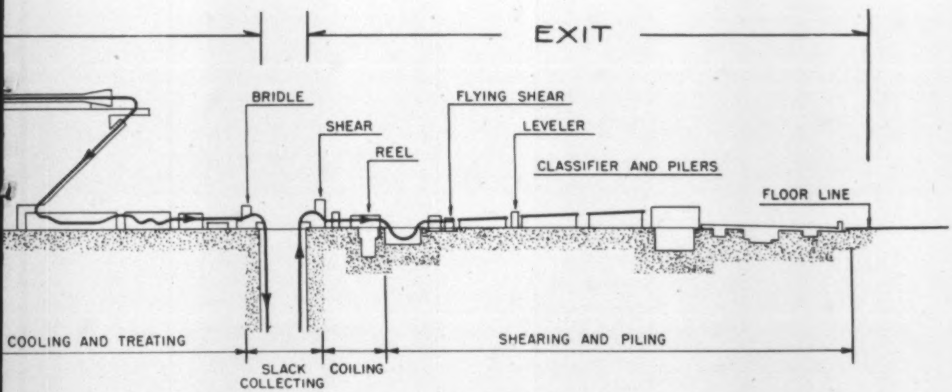
In the exit section, the strip is either recoiled or sheared into specified sheet lengths. The cut sheets are classified, with any unacceptable material being diverted into a reject piler, and prime sheet roller-leveled and automatically stacked.

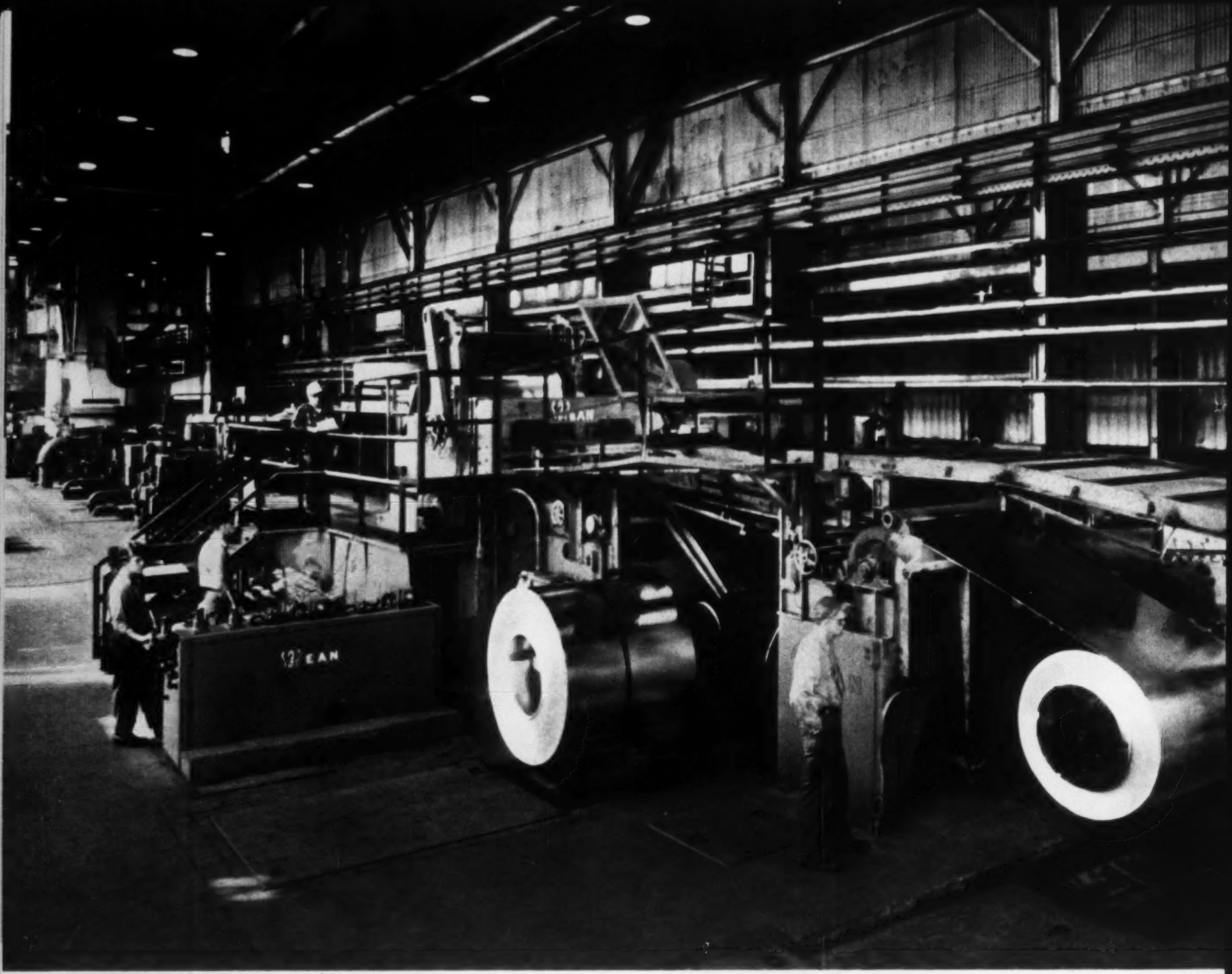




In 1955,

Wheeling installed its second Wean-built galvanizing line at Martins Ferry


EXIT
BRIDLE
SHEAR
REEL
FLYING SHEAR
LEVELER
CLASSIFIER AND PILERS
FLOOR LINE
COOLING AND TREATING
SLACK COLLECTING
COILING
SHEARING AND PILING



No. 1 continuous galvanizing line at Republic Steel Corporation's Warren, Ohio works. No. 2 line at this plant is under construction. Republic has a third Wean-built line at its Gadsden, Alabama plant.

The Wean Engineering Company is proud to have had the opportunity to work in close association with the Wheeling Steel Corporation and its licensees in the design and construction of all Wheeling-type galvanizing lines.

Wean is also currently participating in the design and construction of the world's largest Wheeling-type galvanizing line, planned for Bethlehem Steel Company's Lackawanna Plant. This line will be capable of handling 70,000 lb. coils with a maximum O.D. of 75″ and a maximum strip width of 72″. Operating at speeds up to 300 fpm, the new line will produce a range of galvanized sheet from 8 through 30 gauges.

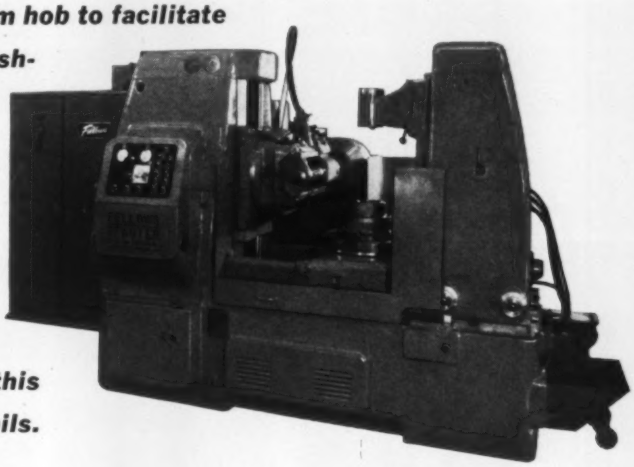
As in this particular phase of steel technology, Wean has played a dominant role in the development of improved, more productive sheet, strip and tin plate processing facilities for every major steel producer. This three-decade background of "creative engineering" experience is ready to serve you in meeting your production requirements.

THE WEAN ENGINEERING COMPANY, INC.· WARREN, OHIO, U.S.A.

NOW...A Larger Capacity FELLOWS-PFAUTER High-Speed Hobbing Machine...The P 630

You get all the advanced-design features of the production-proved P 400 Fellows-Pfauter hobbing machine — plus extra work capacity — with this new Model P 630. Takes work up to 25″ diameter. Maximum face width at 25″ diameter is 16¼″. Maximum diametral pitch in steel is 3.

Work area is readily accessible for setup and loading, and table retracts automatically from hob to facilitate work changes. Hob shifting is by push-button. It's solid too, with rugged hob head and double wall construction column and bed, and heavy V-ways. Table is as large as maximum workpiece diameter — work column of massive design.



Reduce your production costs with this new Fellows-Pfauter. Write for details.

CHANGE GEAR TABLES

NEW . . . Dictionary of Change-Gear Combinations

"Fellows-Pfauter Change Gear Tables" by F. Becher and A. Koerner eliminates tedious calculations and trial-and-error methods. Gives combinations for more than 26,000 ratios carried to six decimal places from .100,000 to 1.000,000, with greatest step approximately .00005. Gears in range of 18 to 80 teeth mainly used. Examples are given. Only $8.00. Order from THE FELLOWS GEAR SHAPER COMPANY, 78 River St., Springfield, Vermont, U.S.A.

THE FELLOWS GEAR SHAPER COMPANY
78 River Street, Springfield, Vermont, U.S.A.
Branch Offices:
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150 West Pleasant Ave., Maywood, N. J.
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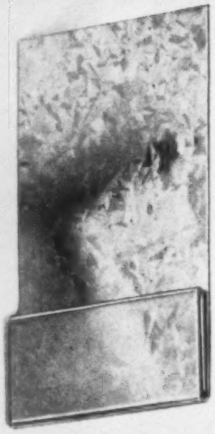
THE
PRECISION
LINE

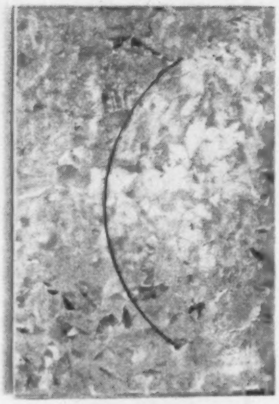
Fellows

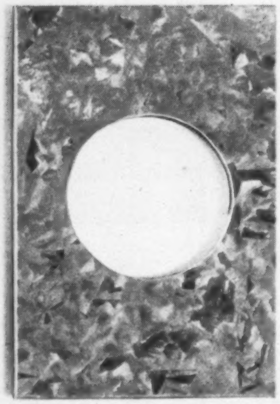
Gear Production Equipment

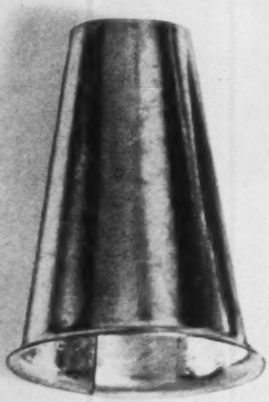
SOFTITE® BY WHEELING

...bend it

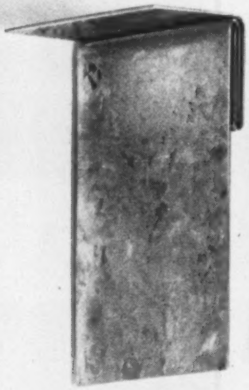

...hem it


...scribe it


...punch it

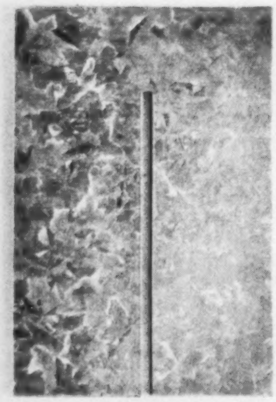

...form it

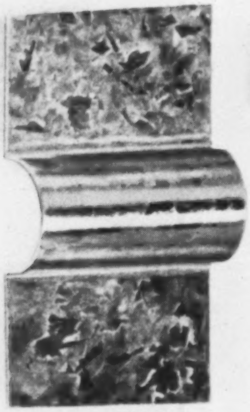
...notch it

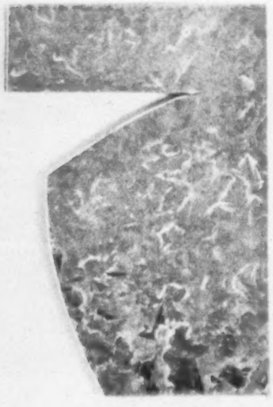

...lock it

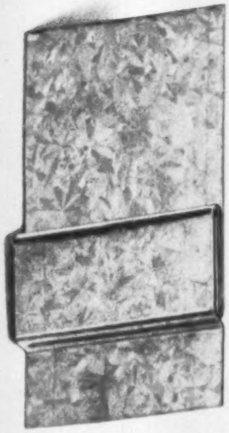
...snip it

...paint it

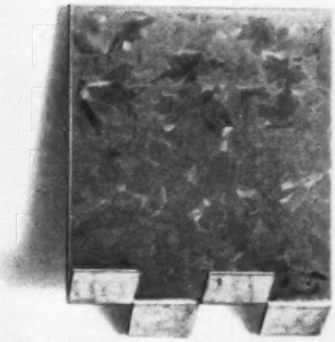

...saw it


...stamp it

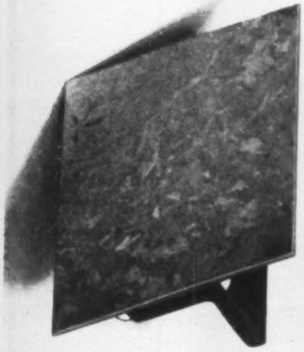

...shear it



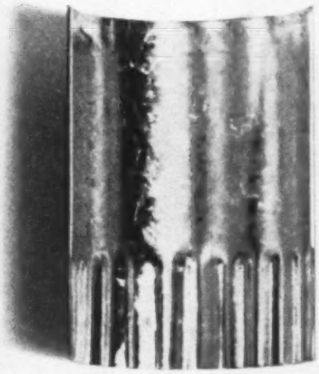
...seam it



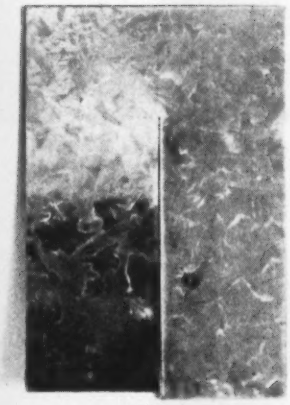
...dovetail it



...weld it



...crimp it



...slit it

...draw it

OUR CHALLENGE STANDS!

"Anything that can be made of steel sheets can be made of Wheeling SOFTITE® galvanized steel sheets!"

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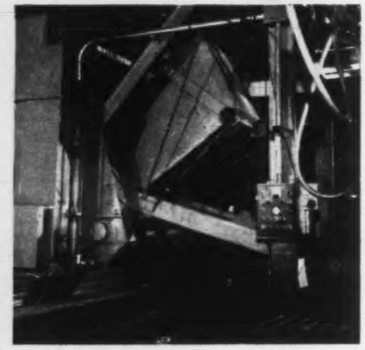
Steel

automated SUPER tumblast® delivers THREE-WAY savings



This Wheelabrator Super Tumblast operates automatically through loading, blasting and unloading cycles. Skip-hoist is designed to accommodate tote boxes for handling unit loads.

A demonstration of WHEELABRATOR'S

VITAL VALUES

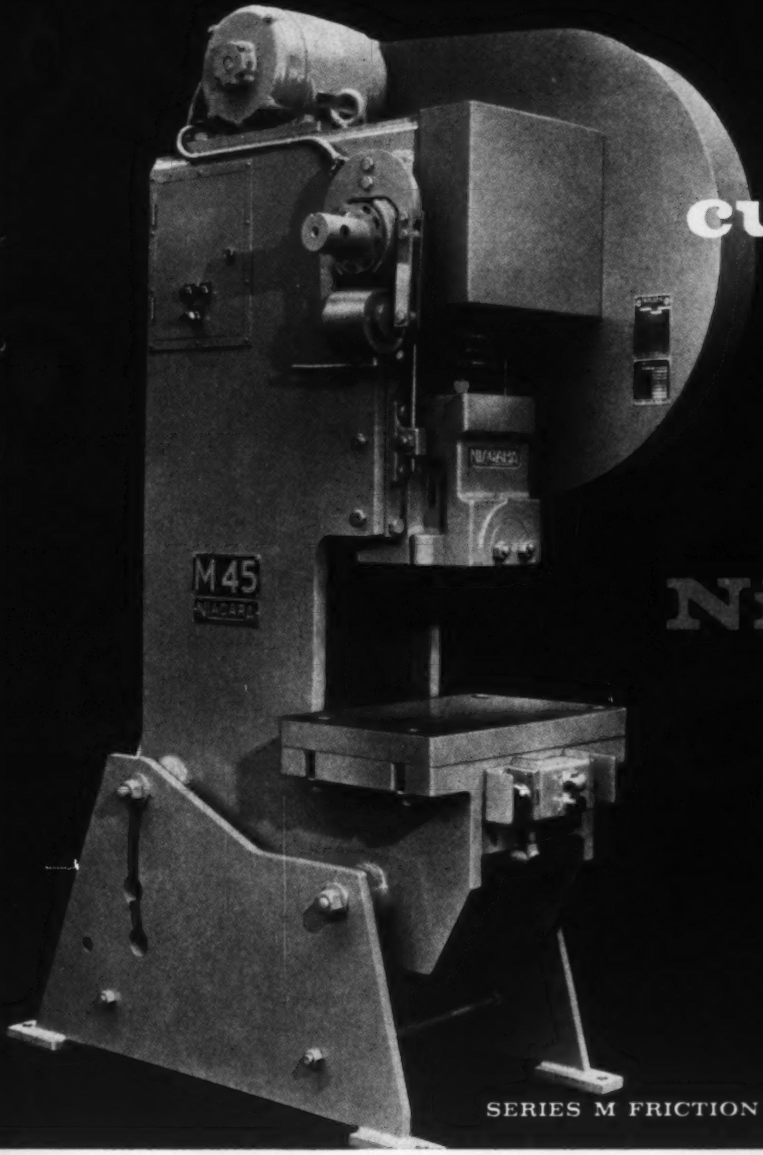
Management at General Foundry & Mfg. Co., Flint, Michigan, can count three important areas of savings, as a result of rearranging their cleaning room around a 22 cu. ft. Wheelabrator Super Tumblast. First, more thorough cleaning permits improved inspection, for increased precision and quality. Second, cleaning cycles have been cut almost in half. Third, the automated operating features of the Wheelabrator blast machine have made it possible to reduce the cleaning room crew from six men to three. Such multiple economies are typical of the vital savings you can expect with Wheelabrator equipment. Get the new Super Tumblast story by writing for Catalog 162-D.

VITAL VALUES FOR INDUSTRY

W

WHEELABRATOR
AIRLESS BLAST EQUIPMENT

WHEELABRATOR CORPORATION, 510 S. Byrkit St., Mishawaka, Indiana, In Canada, WHEELABRATOR CORPORATION OF CANADA, LTD. 1901 Birchmount Rd. P.O. Box 490, Scarborough, Ontario
A subsidiary of Bell Intercontinental Corp.



what customers like most about Niagara's new OBI line

SERIES M FRICTION CLUTCH OBI

Already in the field and on the job in substantial numbers, the new Series M is drawing a very significant response from production people. Here, briefly, are the features generating the most comment:

EXTRA RUGGED, NEW WELDED STEEL FRAME . . . surpasses in stiffness even the high standards by which Niagara OBI's have been known for years. Dramatically less vertical and angular deflection prolongs die life, assures uniformity of work.

FULLY ENCLOSED DRIVE . . . improves safety factor by eliminating exposed rotating parts. Front guard shields operator from oil splashes.

COMPACT BUILT-IN PRESS CONTROL . . . assembled with the latest in compact components. Nothing protrudes.

SLOW, LOW ENERGY, POWER-OFF JOGGING . . . When in "Jog" position, the Selector Switch *disconnects main motor*. Pressing 2 palm buttons (both hands) brings slide down slowly and smoothly. A separate motor jog button permits small shots of energy to be restored to flywheel as required. Die-setting is easier, faster, safer.

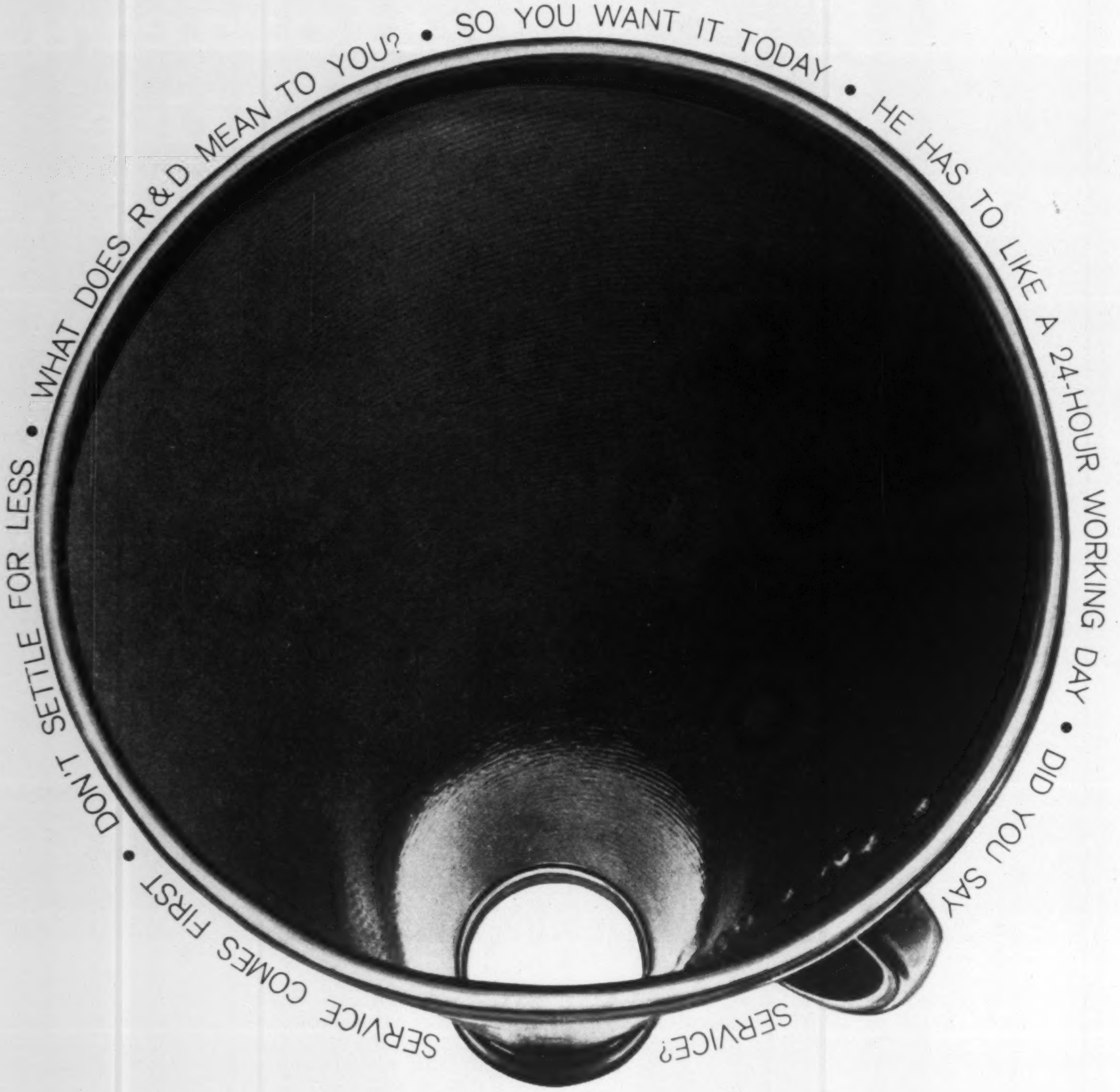
EXTRA LONG, RIGID SLIDE . . . prevents deflection of guiding ways. Exceptionally generous front-to-back mounting space, with mounting holes in front, rear, and sides, gives dies more solid support. New design provides for circulating oil and keeps oil out of die area.

Niagara Series M OBI Presses are available in 4 sizes (both non-geared and single geared) with shaft diameters from 2½" to 4" and capacities from 22 to 60 tons. A specialized design is built for automatic ultra high speed production. For the full story, send today for Bulletin 54. Niagara Machine & Tool Works, Buffalo 11, N. Y. District Offices and Distributors Everywhere.

NIAGARA

America's most complete line of presses, press brakes, shears, other machines and tools for plate and sheet metal work.

we've said our piece about VCA service



VCA "SERVICE COMES FIRST" CONTEST

You've seen the ads. You've read the story of VCA's "extra-value-through-extra-service" policy. You're aware of the importance to the industry and to your company of VCA's fully integrated operation, R&D program, complete product line, strategically located plants, and all the other things we've discussed. But there's one thing the ads couldn't cover... how VCA Service has helped you specifically. So, we're running a contest... a contest to get you to tell us.

Who Can Enter. The VCA "SERVICE COMES FIRST" CONTEST is open to anyone who has benefited from VCA service... researchers, PA's, production men, engineers, melters, even presidents.

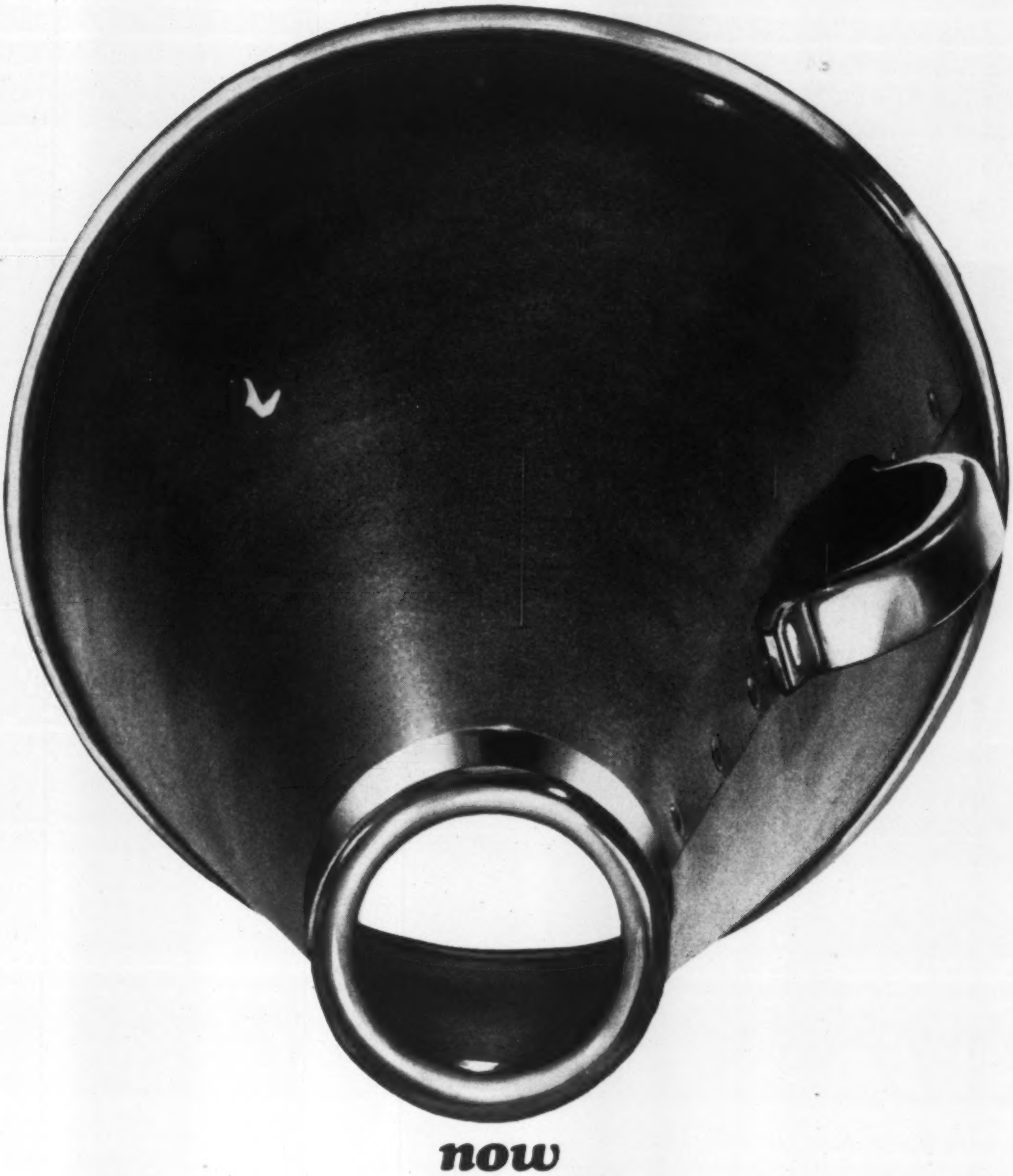
How To Enter. Simply write a letter describing how VCA SERVICE has at some time or other helped you or your company solve a problem, cut costs, do a better job or make a better product. Tell us how, why, when, where, and for whom. Letters may be handwritten or typed, and may be of any reasonable length. Sketches, photographs or other supporting evidence may be included.

Judges. The VCA "SERVICE COMES FIRST" CONTEST will be judged by a distinguished panel chosen from editorial, university, association and industry sources. Names will be announced at a later date.

Closing Date. Entries must be mailed to

VCA "SERVICE COMES FIRST" CONTEST
Vanadium Corporation of America
420 Lexington Ave., New York 17, N. Y.

and postmarked no later than November 20, 1961. Entries become the property of VCA and cannot be returned.



now you tell us

Prizes.

1st.	FIVE — $100 U. S. Gov. Bonds, Series E
2nd.	FIVE — $50 U. S. Gov. Bonds, Series E
3rd.	FIVE — $25 U. S. Gov. Bonds, Series E

Additional Prizes.

4th	$100 U. S. Gov. Bond, Series E
5th	$50 U. S. Gov. Bond, Series E
6th	$25 U. S. Gov. Bond, Series E
7th	$25 U. S. Gov. Bond, Series E
8th	$25 U. S. Gov. Bond, Series E
9th	$25 U. S. Gov. Bond, Series E
10th	$25 U. S. Gov. Bond, Series E

Bonus Prizes.

100 Stainless Pens for first 100 letters received. In the case of a tie, judges will award duplicate prizes.

Winners will be announced on December 20, 1961. Bonds will be registered in the winners' names and forwarded immediately.

Get More Information at the METALS SHOW. "SERVICE COMES FIRST" will be the theme of VCA's booth at the Metals Show. For more information about the contest, visit VCA Booth No. 338 at the show, being held this year in Detroit, Mich., October 23-27. **DON'T DELAY.. ENTER TODAY**

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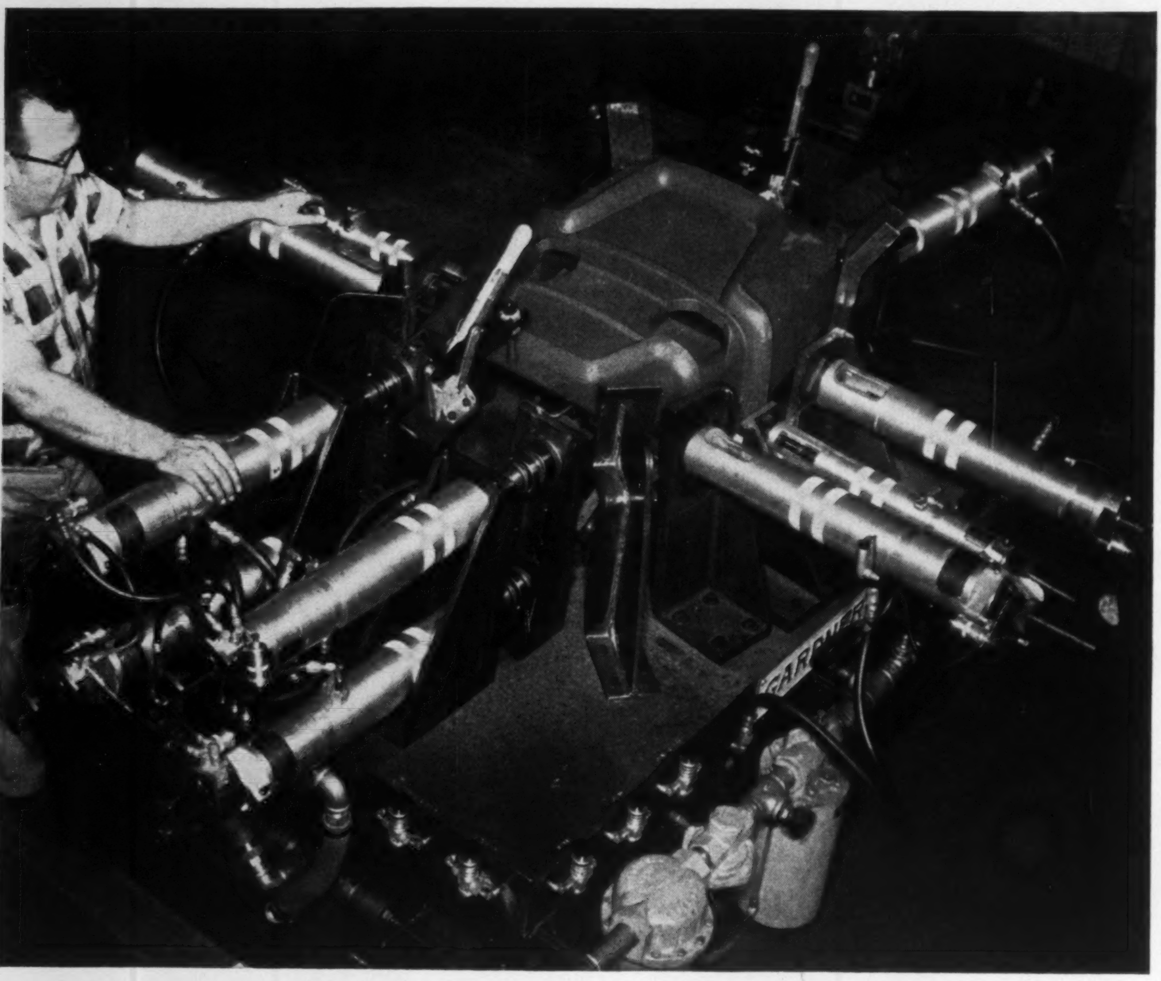

Precision becomes automatic with "Airfeedrills"

Versatile Gardner-Denver "Airfeedrill"® units are easily adaptable to almost any drilling setup. You mount them as a drilling combination of two, 20 or more spindles for automatic hole processing. Use one as a stationary drill mounted on an inexpensive fixture. As a portable drill, "Airfeedrill" hangs by its nose to a jig for precision drilling.

Find out how quickly and inexpensively you can automate your drilling operations. Contact your Gardner-Denver air tool specialist or write for Bulletins 92-1 and 92-121.

Portable Applications—"Airfeedrill" hangs by its nose to a jig for precision drilling.

GARDNER-DENVER
Since 1859

EQUIPMENT TODAY FOR THE CHALLENGE OF TOMORROW

GARDNER - DENVER

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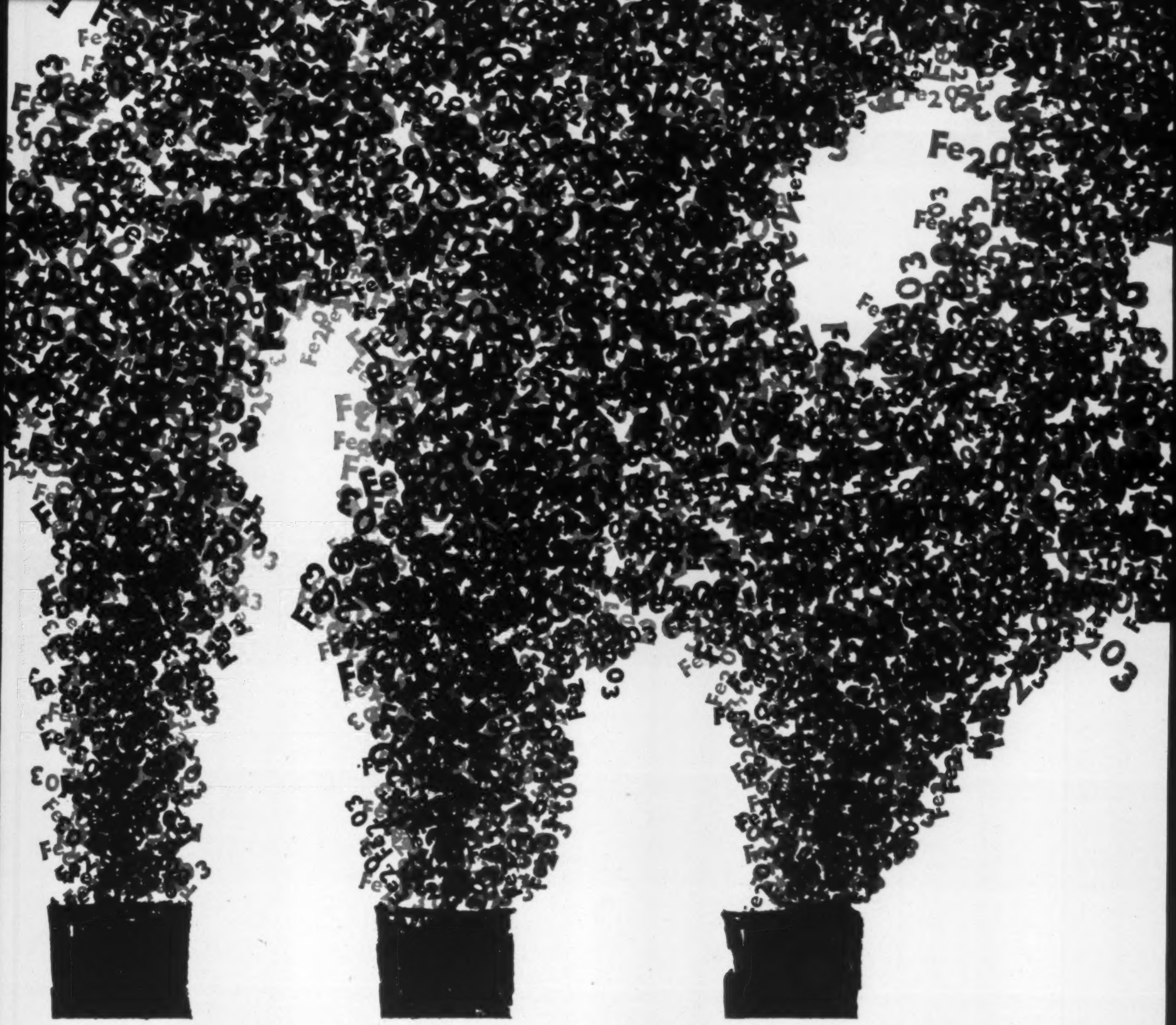


USING O_2 IN YOUR OPEN HEARTH? Chemico Venturi Scrubbers do more than simply solve the air polution problems brought on by the use of oxygen in steel making. Operating and performance figures indicate that for oxygen steel converters, oxygen lanced open hearth furnaces, electric furnaces and flame scarfing, the Chemico Venturi Scrubber solves those problems with higher efficiency and at lower cost than any other method now in operation. Specifically, these are the advantages of a Chemico Venturi Scrubbing System:

CAPITAL INVESTMENT—Chemico Venturi Scrubbers can be installed for approximately 30-50% less capital cost than required for electrostatic precipitators.

OPERATING AND MAINTENANCE COSTS—Chemico Venturi Scrubbers require so little maintenance and manpower, that over-all operating costs are dramatically lower than for other methods, even though power requirements may sometimes be slightly higher.

CONSISTENT PERFORMANCE—The Chemico Venturi Scrubber attains maximum cleaning efficiency at start-up. This peak efficiency is not decreased by subsequent changes in the gas flow or other variations in process conditions.

COLLECTION AND DISPOSAL—The Chemico Venturi Scrubber collects iron oxide dust wet and recovers it dry—free of contaminants and ready for re-use. It eliminates the common and very serious problem of how to handle and dispose of dry dust collected in an electrostatic precipitator.

WATER REQUIREMENTS—The Chemico closed cycle scrubbing process eliminates water disposal problems and cuts make-up water requirements to a minimum. Normally, no more than 50-100 GPM is needed.

PROCESS FLEXIBILITY—Adjustable Venturi throat permits automatic control of furnace draft while maintaining full cleaning efficiency.

If you are considering the installation of gas cleaning equipment, a Chemico representative would be pleased to discuss performance and cost figures with you. Chemico handles the complete job:

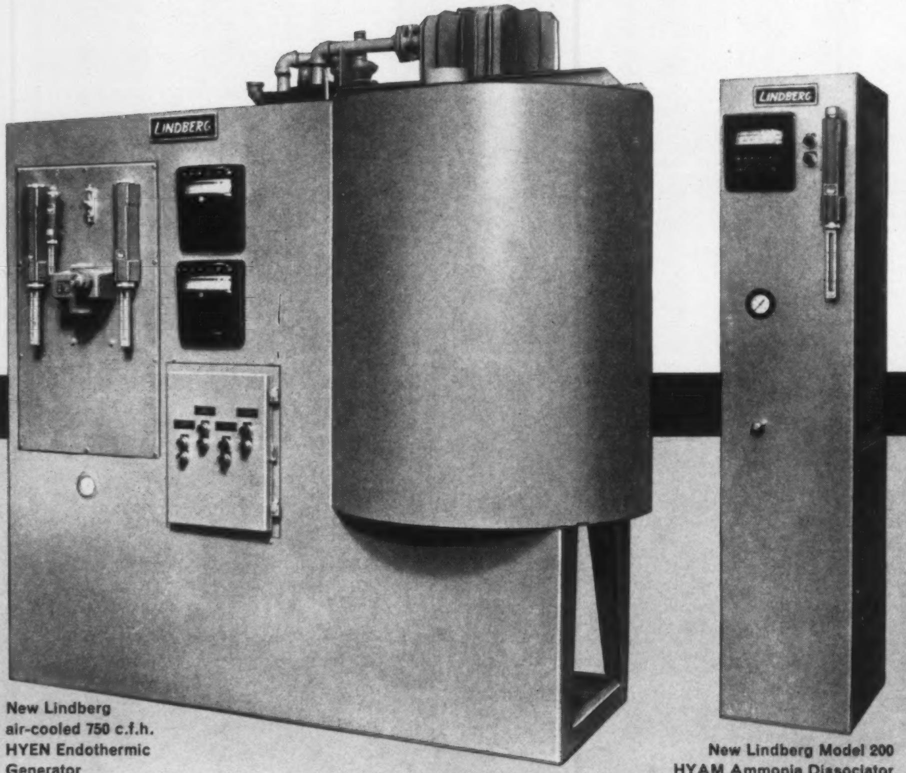
PLANNING—DESIGN—ENGINEERING—CONSTRUCTION and START-UP.

CHEMICO

Chemical Construction Corporation, Gas Scrubber Division, 320 Park Ave., New York 22, New York
Ferndale, Mich. Chicago, Ill. Los Angeles, Calif. Houston, Tex. Bartow, Fla. Birmingham, Ala. Pittsburgh, Pa.

There's one sure way

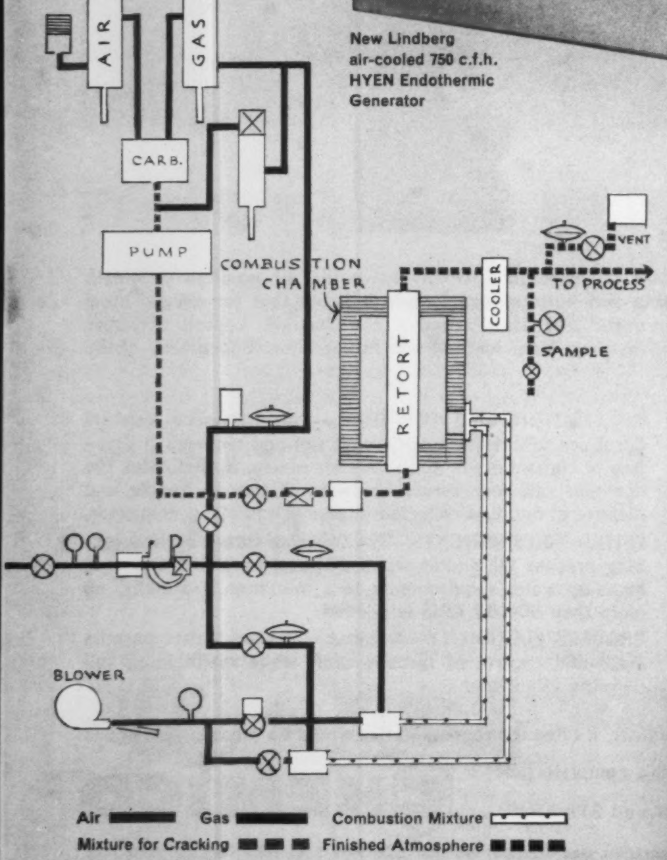
You'll see these brand-new Lindberg Generators at the Metal Show


LINDBERG
LINDBERG

New Lindberg air-cooled 750 c.f.h. HYEN Endothermic Generator

New Lindberg Model 200 HYAM Ammonia Dissociator

Schematic Flow Diagram of Lindberg HYEN Generator


AIR
GAS
CARB.
PUMP
COMBUSTION CHAMBER
RETORT
COOLER
VENT
TO PROCESS
SAMPLE
BLOWER
Air
Gas
Combustion Mixture
Mixture for Cracking
Finished Atmosphere

To be shown for the first time are two Lindberg generators designed and engineered for improved efficiency and economy in the production of metallurgical atmospheres.

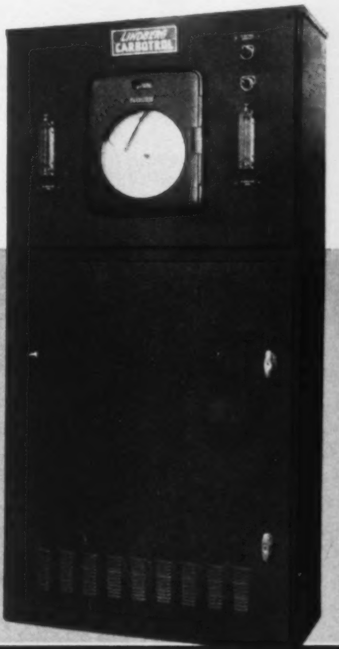
The new Lindberg HYEN ENDOTHERMIC GENERATOR is a fully automatic process for producing low cost protective atmospheres for bright hardening, bright annealing or bright brazing of steel totally free from decarburization or carburization. It will provide significant production economies, more precise operation and lowered maintenance costs. This new unit is *air-cooled*, eliminating the expense and trouble of water cooling systems. The HYEN Generator is available in 200, 500, 750, 1000 and 1500 c.f.h. capacities and larger sizes can be provided if desired.

The Lindberg HYAM AMMONIA DISSOCIATOR, Model 200, is a brand-new development offering a combination of efficiency, capacity and compactness never before available to industry. The unit requires *less than 2 square feet of floor space.* Operating at capacities up to 200 c.f.h., it is *guaranteed* to maintain or exceed 99.95% dissociation efficiency (at 150 c.f.h. 99.99% efficiency is guaranteed). It is particularly designed for pilot plant applications, research and development, where high purity of atmosphere is required.

LINDBERG
heat for industry

to get the right information on methods and equipment for producing and controlling

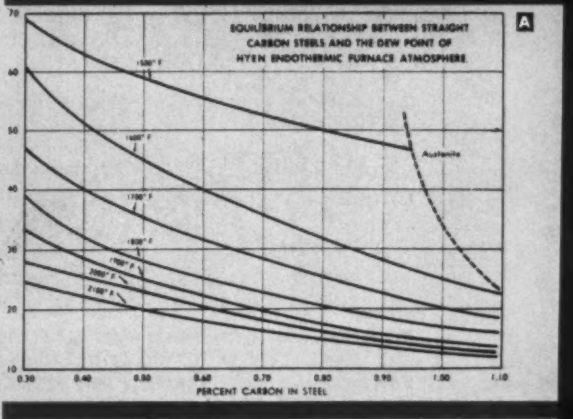
metallurgical atmospheres

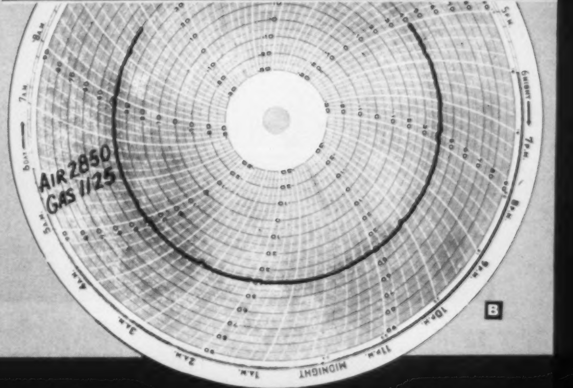


Lindberg Carbotrol available for either dew-point or CO_2 infra-red control systems

A—Dew point equilibrium curves for use with Carbotrol have been established by Lindberg for types of steel and temperatures involved.

B—Typical graph of Carbotrol performance. Note consistency of control.





Talk it over with Lindberg in Booth No. 706 at the Metal Show

Because of the importance of metallurgical atmospheres in metal working we are giving the subject major emphasis in our exhibit at the Metal Show. Visit us there and you'll be able to learn about all the latest developments in methods and equipment for producing and controlling these atmospheres. You'll find us well qualified to offer authoritative advice in this field because we've pioneered in it.

In equipment, the first endothermic atmosphere generator was developed by Lindberg many years ago. Through the years generators for varied types of metal treating atmospheres have been developed, including units for exothermic, dissociated ammonia and inert atmospheres. And we have kept adding refinements and improvements to set continually higher standards of efficient and economical performance.

Years ago, too, Lindberg designed the first equipment for controlling metallurgical atmospheres, the Lindberg Carbotrol. For this, Lindberg research also created dew point equilibrium curves to establish proper atmosphere values for types of steel and temperatures involved. The Carbotrol automatically controls these values. It is also available incorporating the new CO_2 infra-red system of control. Since Lindberg makes both types we are in an ideal position to recommend the method most suitable for your specific processes.

When you visit us at the Show you'll also be able to get the latest information on Lindberg's complete line of heat treating equipment, everything from a laboratory furnace no bigger than a breadbox to a gantry type installation six stories high.

If you don't get to see us at the Show you can get full information on all Lindberg equipment from your local Lindberg Field Engineer (see your classified phone book) or write us direct. Gas Process Division, Lindberg Engineering Company, 2452 West Hubbard Street, Chicago 12, Illinois.

Los Angeles plant: 11937 S. Regentview Avenue, Downey, California. In Canada: Birlefco-Lindberg Ltd., 15 Pelham Ave., Toronto 9, Ont. Also, Lindberg plants in Argentina, Australia, England, France, Italy, Japan, Spain, Switzerland and West Germany.

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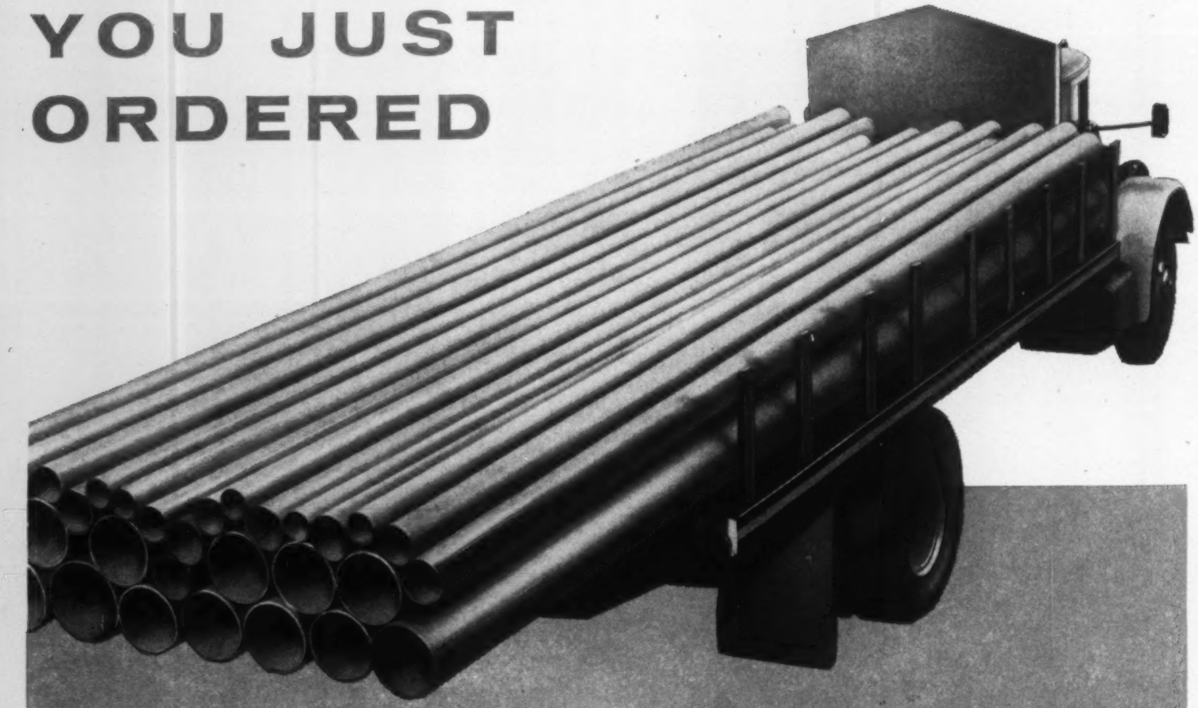
THE PIPE YOU JUST ORDERED



LARGE DIAMETER STAINLESS STEEL PIPE —IMMEDIATE DELIVERY FROM SWEPCO DISTRIBUTORS

No more waiting — Your order is filled from warehouse stock.

SIZE RANGES:

2½" - 12" in Schedules 40 and 80 in 20' to 24' lengths
5" - 12" in Schedules 5 and 10 in 20' to 24' lengths

Available in all types of stainless steel and special metals and alloys to 30" OD in walls to 2" thick. Swepco distributors are ready to help you in selecting the exact and most economical grade of pipe for your particular application.
Call or write for full information.

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Manufacturers of FFR Full Finished Rock-Forged Pipe and Tubing

STEEL SERVICE CENTER INSTITUTE

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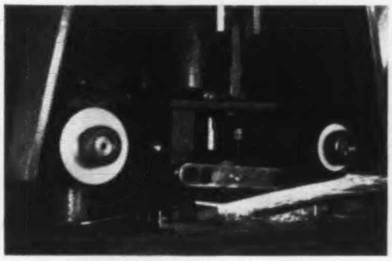
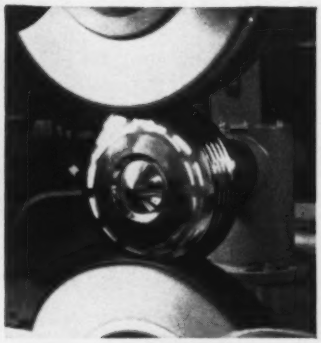
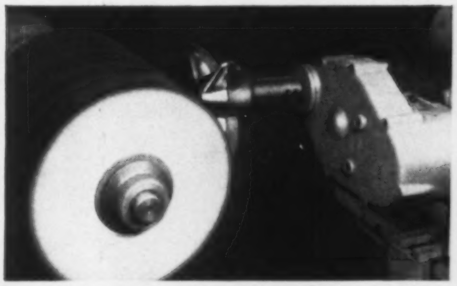
ACME IN ACTION





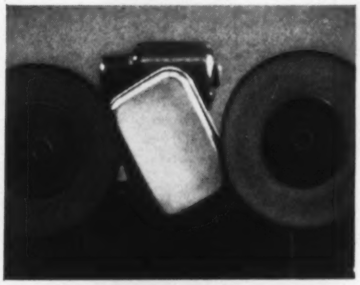
Doing more work with *Movement and Motion*



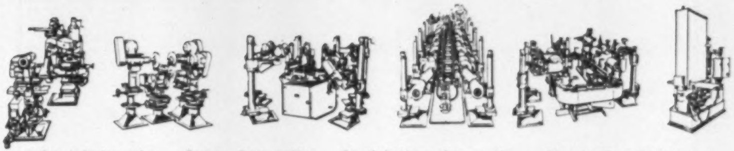
Here are eight good examples of Acme finishing machines in action—automatics and semi-automatics—performing grinding, deburring, polishing and/or buffing operations on a wide variety of parts and products. Yet different though they may be, all of these jobs—and countless others, too—have one thing in common: *Because the machines are* "ACMES", *the finishing operations are being performed quickly, easily, uniformly—and at lower cost than was realized with previous methods.*

How about your product finishing operations? Chances are they represent a substantial percentage of your manufacturing costs. And chances are, too, that Acme engineers can help you find ways to effect worthwhile savings. Whether your parts are large or small, simple or complex. Drawn, spun, extruded, die-cast, forged, or machined. And regardless, too, of what your production requirements may be! Why not send samples and job specifications today for analysis and recommendations? There's no charge—no obligation, of course.

SEE ACME IN ACTION
AT THE METAL SHOW
BOOTH No. 263
COBO HALL • DETROIT
OCTOBER 23-27, 1961



DEBURRING • GRINDING • POLISHING • BUFFING



Comprehensive catalogs available upon request. Write, wire or call:

ACME MANUFACTURING COMPANY

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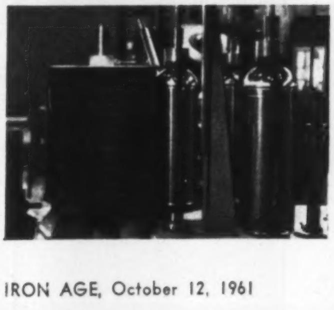
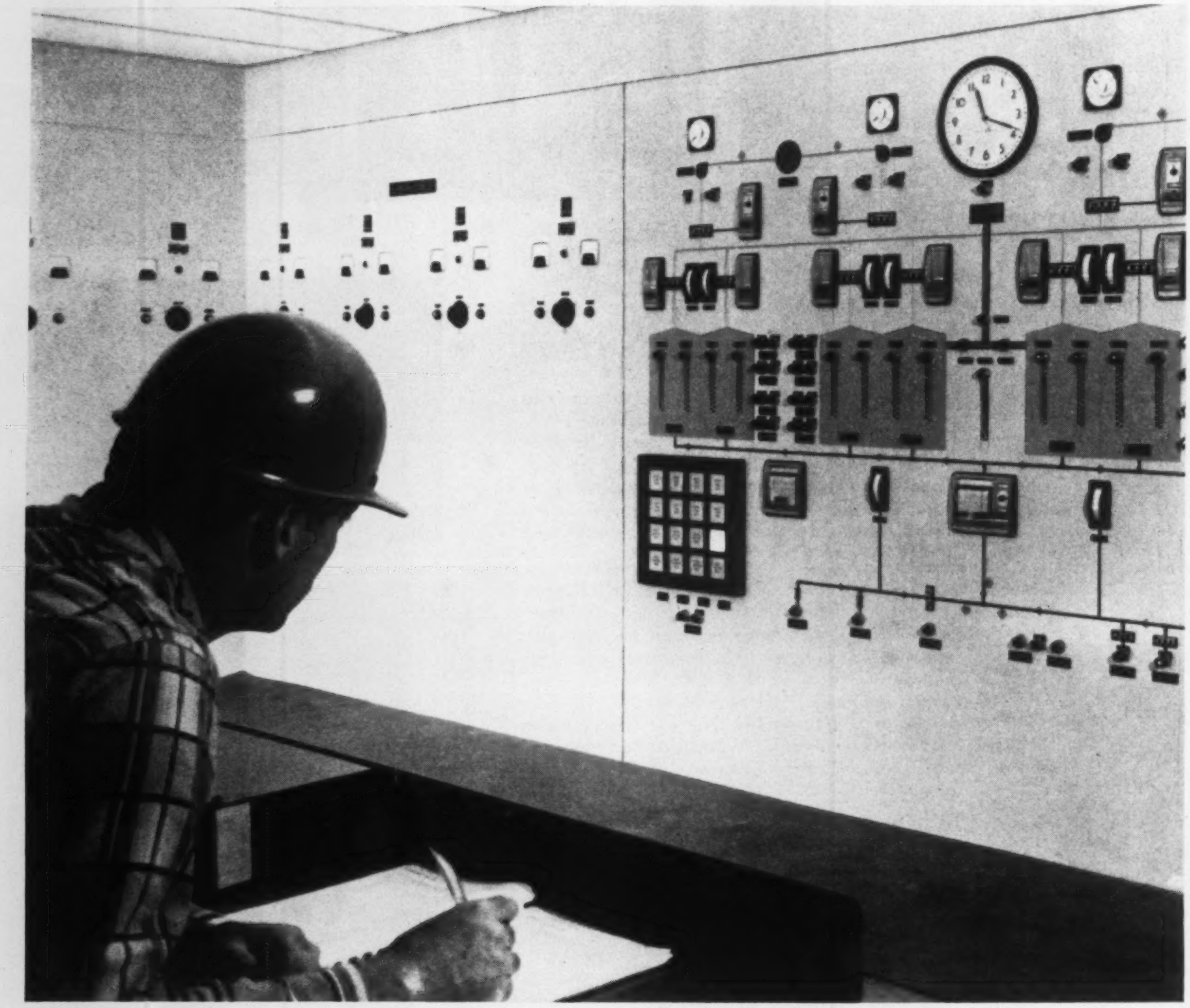
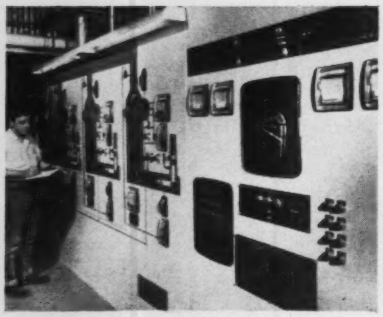
Leading Producers of Automatic Polishing, Buffing and Deburring Machines Since 1910



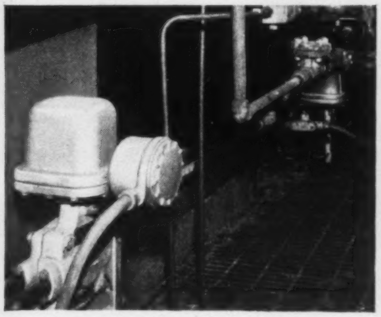
Foxboro Electronic Instruments



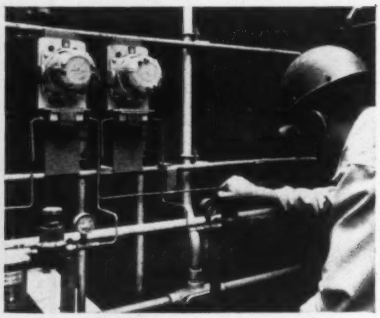
Foxboro's Electronic Consotrols control four precipitators from this central panel for Jones & Laughlin's big smoke abatement system in Cleveland. Contracting Engineers: Loftus Engineering Co.



Waste heat boiler control panel includes Foxboro electronic controllers, recorders, converters, integrators, and alarms.

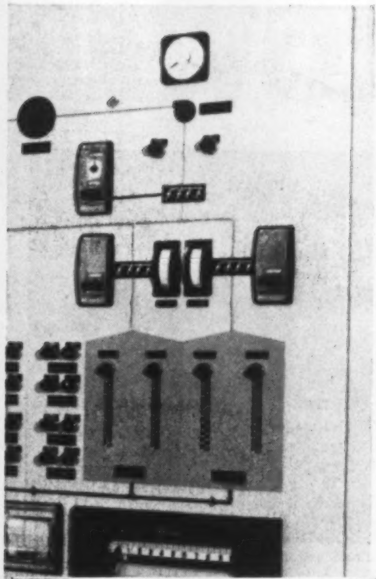


Foxboro d/p Cell* Transmitter measures boiler flue draft with an accuracy of ±0.5%.



Foxboro Transducers convert electrical signal from control panel, for controlling dampers.

help curb smoke nuisance at J & L's Cleveland Works



Foxboro instruments assure fast, dependable control for huge smoke abatement system

FOXBORO
08 06 04 02 0

Foxboro Indicating Differential Pressure Transmitters on precipitator are linked to central control panel by 10-50 ma, d-c signal. Transmitters are completely weatherproof — need no protective housings.

Giant new equipment removes dust from gases in the stacks at Jones & Laughlin's Cleveland Works. To control the big waste gas cleaner at top efficiency, J & L relies on fast, dependable Foxboro Electronic Consotrol* instruments.

Measurements are transmitted to the remote control panel instantaneously. There's no transmission lag — even though many Electronic Consotrol transmitters are 600 feet from the panel. And Foxboro's 100% solid state dependability ends maintenance problems — all the tubes are gone. Gone, too, are freezing, fouling air supply systems.

See how Foxboro Electronic Consotrols can pay off in your mill with fast, reliable control. Ask your Foxboro Field Engineer for more details, or write for Bulletin 21-10. The Foxboro Company, 8010 Neponset Ave., Foxboro, Mass.

**Reg. U. S. Pat. Off.*

FOXBORO
REG. U. S. PAT. OFF.

CHOOSE THE HYATT VERSATILITY...LOWER

MORE FLEXIBLE ASSEMBLY

Interchangeability of Hyatt separable bearing parts permits more flexible assembly. Any HYATT Metric Radial Series separable inner race, for a given piece number, can be assembled with any HYATT outer race and roller assembly of the same piece number.

Because of this interchangeability, it is practical to install separable HYATT inner races on shafts in one location, while the outer races and rollers are installed in housings at another location. When the sub-assemblies are brought together, the bearing parts will match perfectly. There is seldom need for selective assembly.

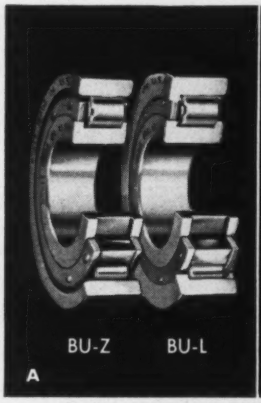
INCREASED SHAFT DIAMETERS

When the designer wishes to use a larger, more rigid shaft, without increasing the size of the housing bore, he utilizes another advantage of HYATT separable bearings. He can eliminate the inner race of the separable inner race HYATT bearing types and operate the bearing rollers directly on the suitably hardened and ground shaft. Space usually occupied by the inner race is available for a larger shaft.

REDUCED HOUSING BORE SIZES

On the other hand, when space limitations force you to reduce the size of the housing bore without decreasing shaft diameter, versatile HYATT separable bearings are again the answer. This time you merely eliminate the outer race of one of the separable outer race HYATT bearing types—and operate the rollers directly on the suitably hardened and ground bore. You save the space normally occupied by the outer race.

And, of course, in applications where it is advisable to retain the complete bearing parts as a unit, HYATTS are available in non-separable assemblies.



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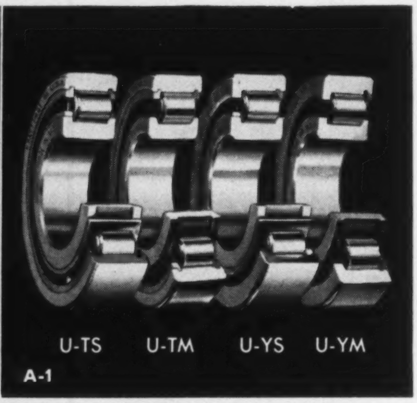
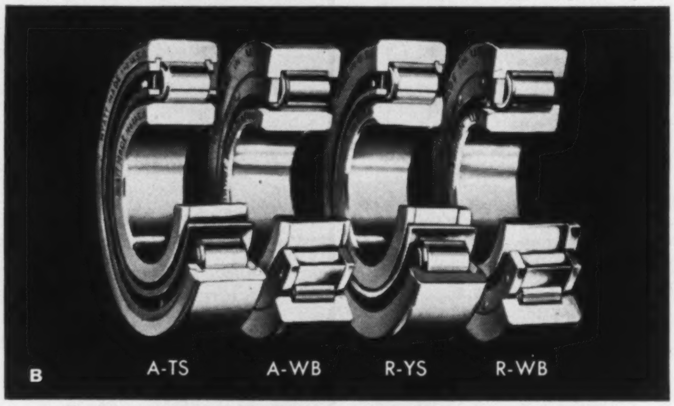


A-1

A. Cutaway view of HYATT Hy-Load separable outer race types.

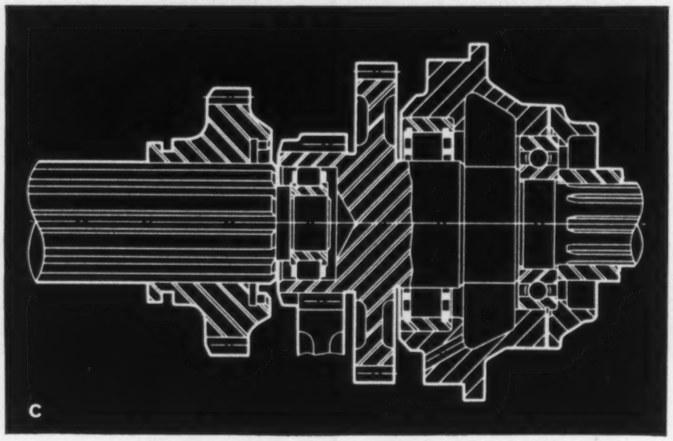
A-1. Cutaway views of HYATT Hy-Load non-separable types (right).



B

B. Cutaway views of HYATT Hy-Load separable inner race types.

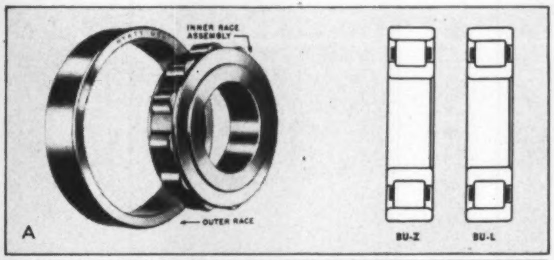
C. Typical transmission application: Pilot bearing is BU-Z type without outer race, operating directly on hardened and ground gear bore, and an A-TS with inner race omitted operating directly on the shaft.



C

LINE FOR COSTS...PERFORMANCE

SEPARABLE RACE ROLLER BEARINGS *with* INTERCHANGEABLE PARTS



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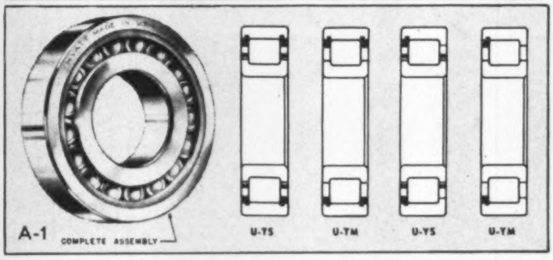

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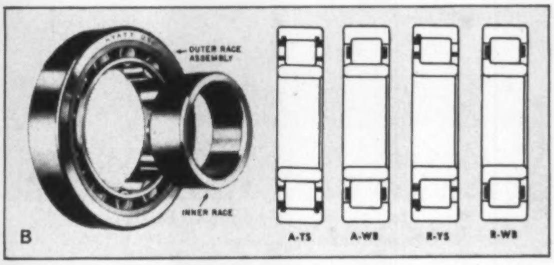

B

Take a look at some typical Hyatt bearing values!

Notice the built-in *versatility* of the various bearing types. Separable race roller bearings—with interchangeable parts—encourage improved product design because they are adaptable to highly individual and unique applications.

Notice the *space-saving* characteristics and the *higher radial load-carrying capacity* of Hyatt separable inner race types. Notice the quality construction, easy maintenance and installation of this Hyatt sample. All this can mean important cost reductions for you!

Now make note of this: in addition to the many typical Hyatt advantages which are apparent at left . . . Hyatt offers, too, the very tangible talent of the Hyatt Sales Engineer—a valuable *working partner* on any product team. For he multiplies Hyatt's obvious advantages of versatility, performance and lower cost with an unbeatable asset for product success—application experience and know-how of the most complete cylindrical bearing line in the industry!

Pick up the phone the next time you want to review your bearing applications—for an overall production or performance advantage for your product. Call your nearest HYATT sales office.

You'll find the best roller bearing engineers anywhere at the other end of the line.

HARRISON, N. J.
HUmbolt 4-4000

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HArrison 7-8277

PITTSBURGH
ATlantic 1-2927

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TRinity 3-7200

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TWin Oaks 3-5362

HYATT ***HY-ROLL BEARINGS***
FOR MODERN INDUSTRY

IN ROLLER BEARINGS, HYATT IS THE WORD FOR GM GENERAL MOTORS RELIABILITY

HYATT BEARINGS DIVISION • GENERAL MOTORS CORPORATION • HARRISON, NEW JERSEY

Portable "service center"

METALOGIKIT

Hundreds of companies have saved money, improved products and cut production waste as the result of opportunities presented by the Ryerson "Metalogikit."

How? This unique kit is a veritable portable service center...lets you explore many alternatives to material you now use. For example, you can compare several different cutting methods on the same piece of steel to see which is best for your application.

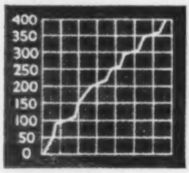
Following are a few random examples showing how Ryerson specialists, using the Metalogikit, have helped customers with a variety of problems—many similar to those you may face every day.

If you would like to put the Ryerson Metalogikit to work for you, call your Ryerson representative for a demonstration—for unbiased recommendations on steel, aluminum, plastics and metalworking machinery.

sparks new ideas and savings

KIT SPOTS SAVINGS

Scratches and grooves normal to cold drawn, seamless tubing caused high manufacturing costs for a company making small, light-wall hydraulic cylinders. The small I.D. had to be honed to eliminate these faults—often too much metal was removed for proper piston fit. A Ryerson specialist suggested a switch to *welded tubing*. Using a sample from his Metalogikit, he pointed out the better finish that eliminates expensive honing. The switch was made with these results: higher production, low reject rate, improved product—plus lower purchase price per foot of tubing.



METALOGIKIT TURNS UP 400% PROFIT

Bidding on a routine job was delayed for one steel fabricator because of an unusual material requirement in the specs—calling for an insulating block of phenolic laminate. For help, the company turned to its Ryerson representative, who showed a sample of Ryertex® sheet stock from his Metalogikit. In addition to having the material available from stock, he was able to show how easily it could be fabricated. This Ryerson know-how, demonstrated by the Metalogikit, enabled the customer to enter his bid on time. He got the job, and made a 400% profit.

KIT SUGGESTS PROFITABLE SPEC CHANGE

Fractures and rejects were extremely high for a manufacturer cold forming two severe bends in flat, hot rolled bars. A Ryerson specialist examined the ⅜" x 2" bar stock and compared it with a sample of M-1020 flattened round bar from his Metalogikit. He explained how controlled carbon of Ryerson M-1020 bar would produce great cost-saving advantages in this operation over hot rolled, mild steel. After specs were changed to this Ryerson-supplied bar, fractures and rejects were substantially reduced—resulting in new profitability.

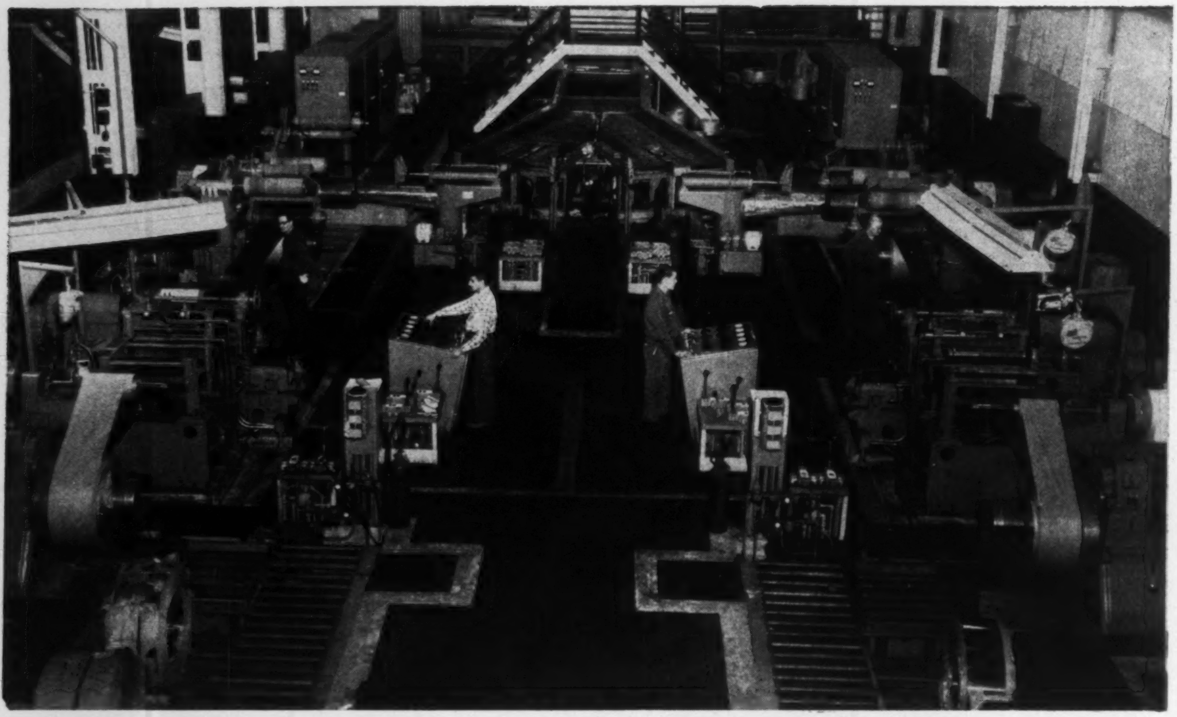
STAINLESS FROM KIT LEADS TO SAVINGS

This company had an emergency requirement for stainless sheets. Application had always called for Type 304, 16 ga. x 66" x 81", *polished on one side.* Their Ryerson specialist questioned the need for polishing. From his Metalogikit, he showed them a sample of 304 with a 2B finish. The company readily agreed it was exactly the finish needed *without polishing*—saving delivery time and material cost. The Ryerson man further suggested 16 ga. x 72" x 144", using the cut-off pieces for another job—reducing scrap waste on *both* requirements. Order was placed and delivered in plenty of time. Over-all result: a substantial saving.

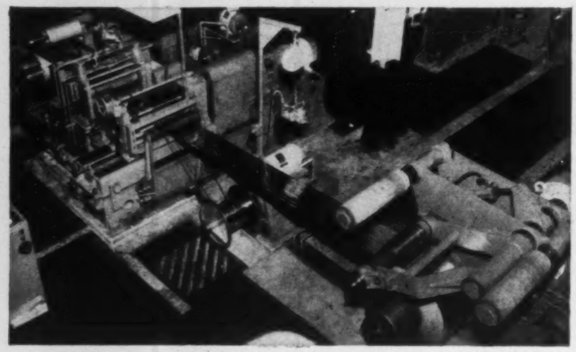
RYERSON METALOGICS

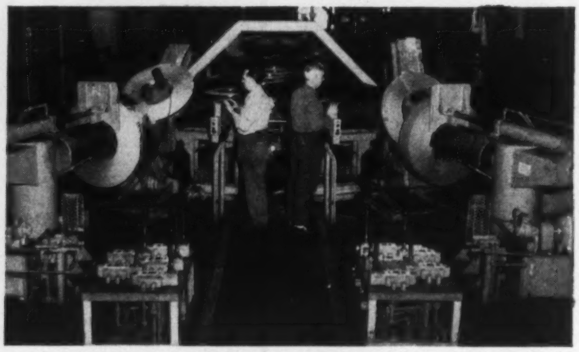
JOSEPH T. RYERSON & SON, INC., MEMBER OF THE INLAND STEEL FAMILY

STEEL · ALUMINUM · PLASTICS · METALWORKING MACHINERY



Predictable Performance...





SECO Slitting Installation, Superior Steel Division, Copperweld Steel Company, Carnegie, Pa.

is automatic—start to finish—with a SECO *Slitting Line*

SECO STEEL MILL EQUIPMENT

- Leveling and Shearing Lines
- Combination Edging and Flattening Lines
- Tension Reels for Strip Polishers
- Narrow Strip Grinding Machines
- Slitting Lines
- Multiple Strand Pull-out Rolls and Take-up Frames
- Strip Coilers (Up and Down Type)
- Traverse Reels for Narrow Strip
- Steel Coil Up-enders
- Scrap Ballers

Affiliated with Lee Wilson Engineering Co., Inc.

SECO

Every operation in this *complete* slitting line by SECO—from entry to exit of coils—is fully automated. It was specifically designed and built by SECO to meet the maximum performance requirements of the Superior Steel Division, Copperweld Steel Company, Carnegie, Pennsylvania.

SECO's staff of experienced sales engineers, specialists in production problem solving, are prepared to show you how you can get "predictable performance" in *your* operation—whatever your requirements. Call or write today. West Coast representative: United Machine Tool Company, Los Angeles, California.

STEEL EQUIPMENT COMPANY

P. O. BOX 737, WARRENSVILLE STATION • CLEVELAND 22, OHIO

CASTABLE FURNACE LININGS

The speed and ease with which refractory linings can be installed with Harbison-Walker castable refractories have resulted in savings of thousands of dollars in furnace construction. H-W castables have excellent dimensional stability, have low permeability and thermal conductivity, and are resistant to spalling and abrasion.

Harbison-Walker has available a *complete* range of castables—from very light insulation to heavy slag-and-abrasion-resistant types—to meet virtually any service requirement.

SAVE TIME AND MONEY

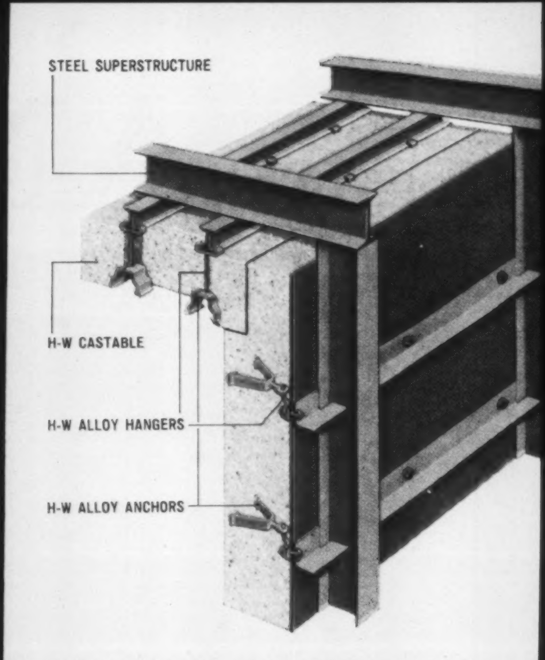
PROPER ANCHORING—KEY TO MAXIMUM SERVICE LIFE

Getting the optimum service life from monolithic structures more often than not depends on proper anchoring or reinforcement. Harbison-Walker has developed a whole series of high temperature metal and refractory anchoring systems to assure proper castable construction. *Complete* technical service is available. Write for details.

HARBISON-WALKER
REFRACTORIES COMPANY

AND SUBSIDIARIES · GENERAL OFFICES: PITTSBURGH 22, PA.

World's Most Complete Refractories Service

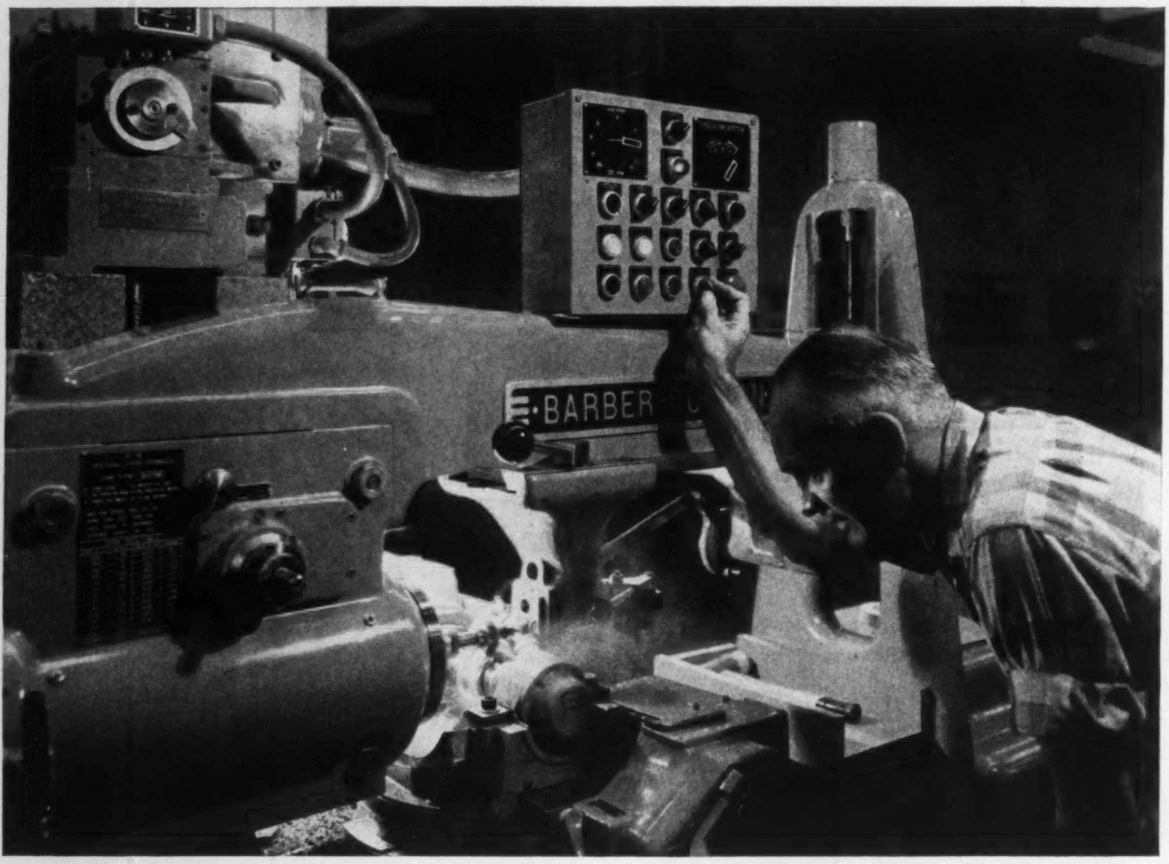

STEEL SUPERSTRUCTURE
H-W CASTABLE
H-W ALLOY HANGERS
H-W ALLOY ANCHORS

A TYPICAL ARCH AND SIDEWALL CONSTRUCTION UTILIZING HARBISON-WALKER CASTABLE REFRACTORIES

EASY TO MIX
EASY TO USE

GUNNING CASTABLES
ON FURNACE WALL
HW-61-17

$24,000 ANNUAL

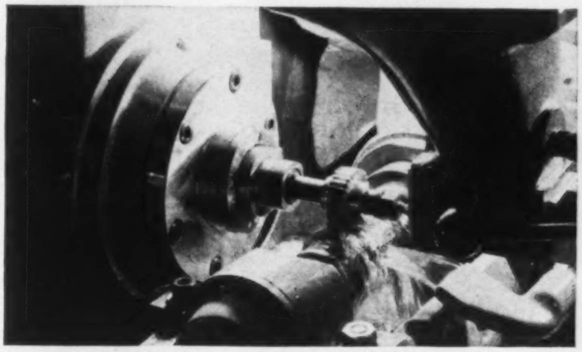


TOTAL JOB ANALYSIS multiplies savings over conventional cost studies

Charles Bruning Company, well-known maker of copying machines and engineering instruments, can now put an additional $2,000 per month into product quality without charging their customers an extra nickel! Part of the reason is the MULTICYCLE version of the No. 16-16 hobbing machine. The machine is so simple and automatic that the operator has time to check his own work. Bruning, in effect, gets 100% inspection free. Savings are the result of objective analysis of the total job, and total cost. The hob is as important to the outcome as the machine. The 16 D.P. gear (shown) measures only 1.875″ on the OD. But on the No. 16-16 it can be hobbed with a 3½″ diam. triple-thread hob. This increases index speed.

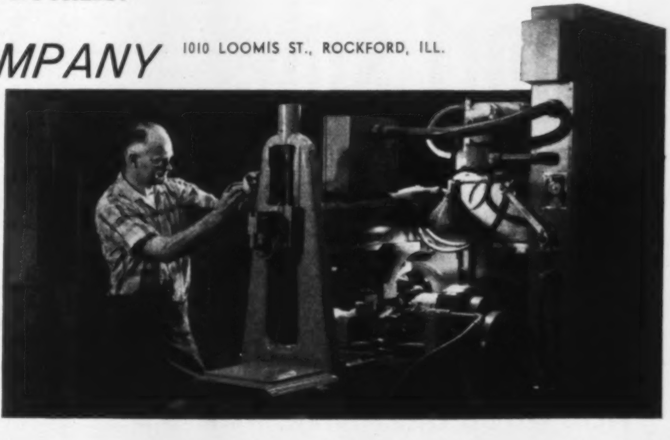
SAVING

Speed is only part of the cost determination. Lowest total cost was Bruning's objective. Reduction of hob approach distance and noncutting time was their answer. Power vertical feed . . . rapid traverse of the workslide and hob carriage . . . and automatic control are three ways to minimize total cycle time. This is the MULTICYCLE concept. Result is conclusive. The right hobs and a modern machine are producing an annual net return of $24,000. ■ Are your costs pegged high by tradition? A new MULTICYCLE machine often pays for itself as a straight replacement. Choice of three preselect automatic cycles gives you complete general-purpose flexibility. Both setup and cycle time are reduced. ■ Take advantage of a Barber-Colman total job analysis. A complete cost evaluation . . . developed from your gear prints and production requirements . . . can be backed by a job simulation for your inspection in our TEST CENTER. Phone your Barber-Colman representative for details.



BARBER-COLMAN COMPANY 1010 LOOMIS ST., ROCKFORD, ILL.

BARBER
COLMAN



Operator checks his own work while the machine is cutting. Side benefit is free 100% inspection.

DAVUM EXPORTATION

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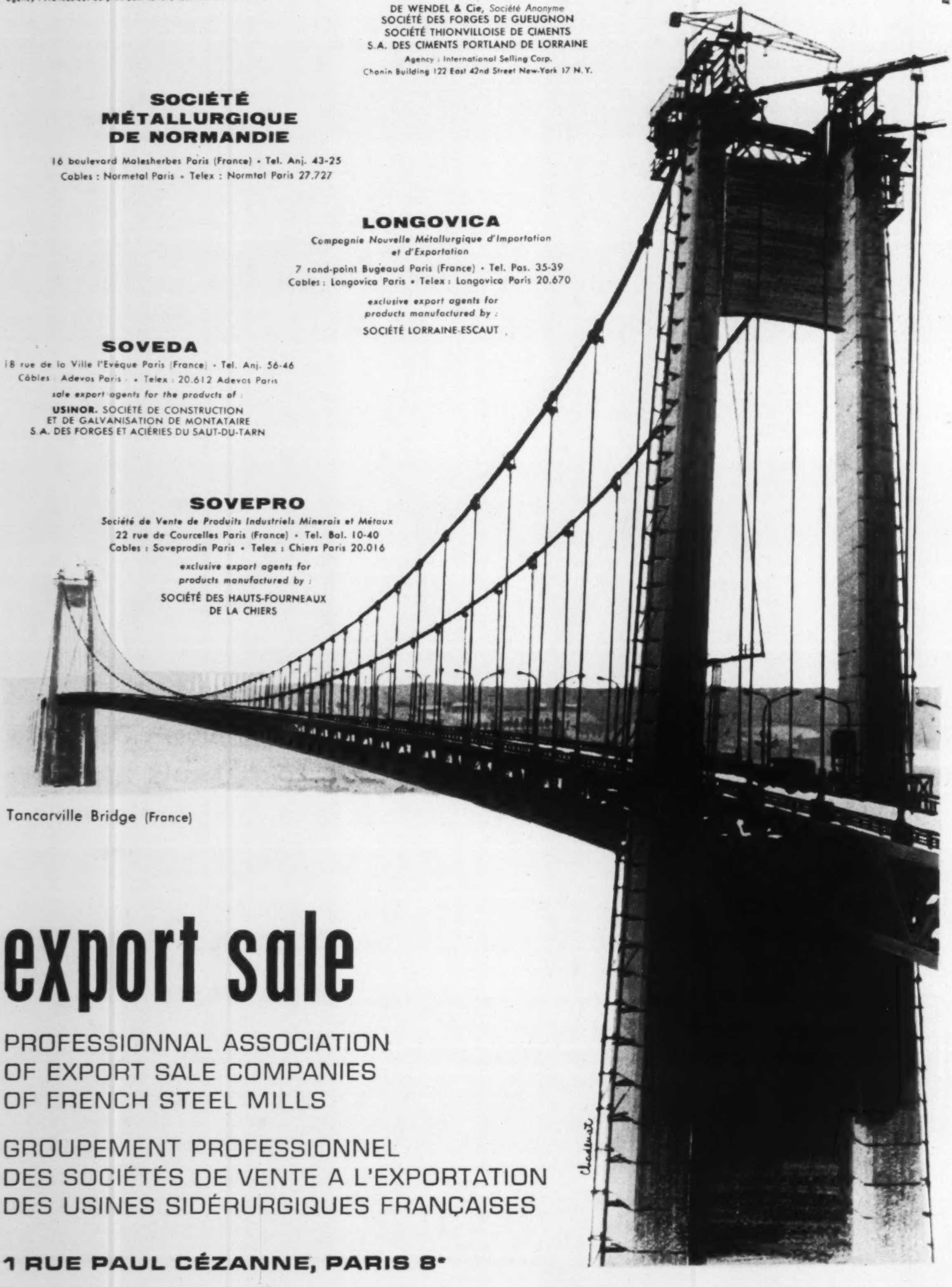

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export sale

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OF EXPORT SALE COMPANIES
OF FRENCH STEEL MILLS

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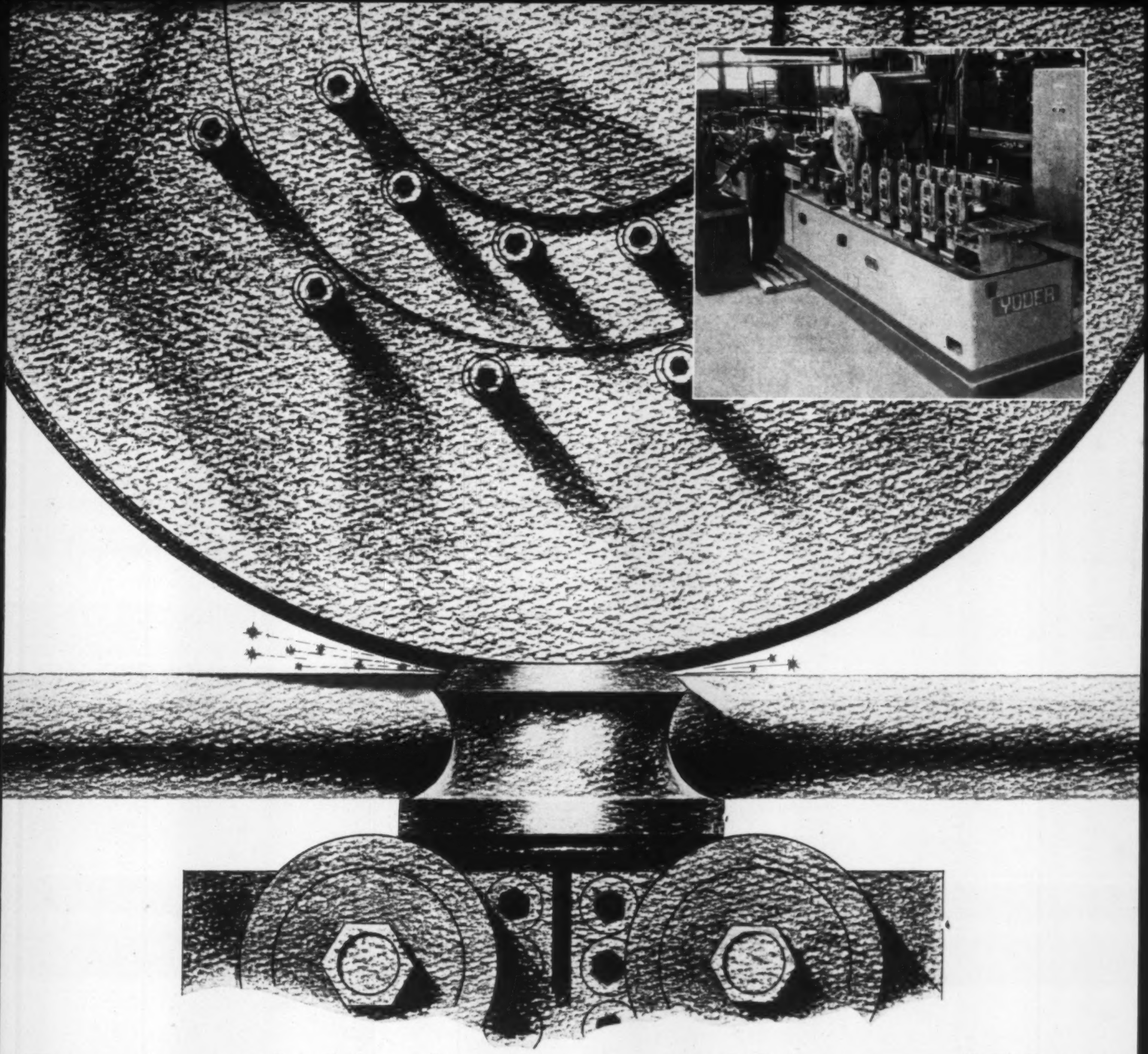

Productivity Increase 19% to 47%

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"TYPE V" PIPE AND TUBE WELDER . . . VAPOR COOLED!

Thousands of hours of tests and actual production point up the major productivity increases achieved by the new Yoder "Type V" Welder. The new Welder is available as a replacement unit for existing equipment or as an original component of a new Yoder pipe or tube mill.

The advanced design and engineering of the Yoder "Type V" Welder is described in a new brochure. This valuable information can be yours by return mail. Send the coupon at the right . . . today!

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Please send me full details on the new Yoder "Type V" vapor-cooled pipe or tube welder.

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Company______________________________

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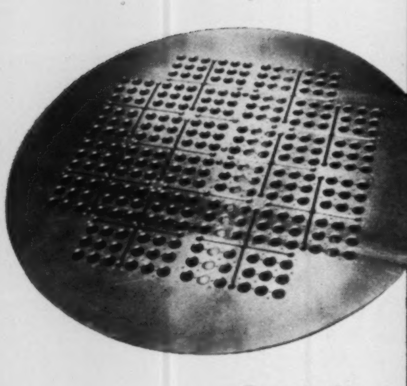
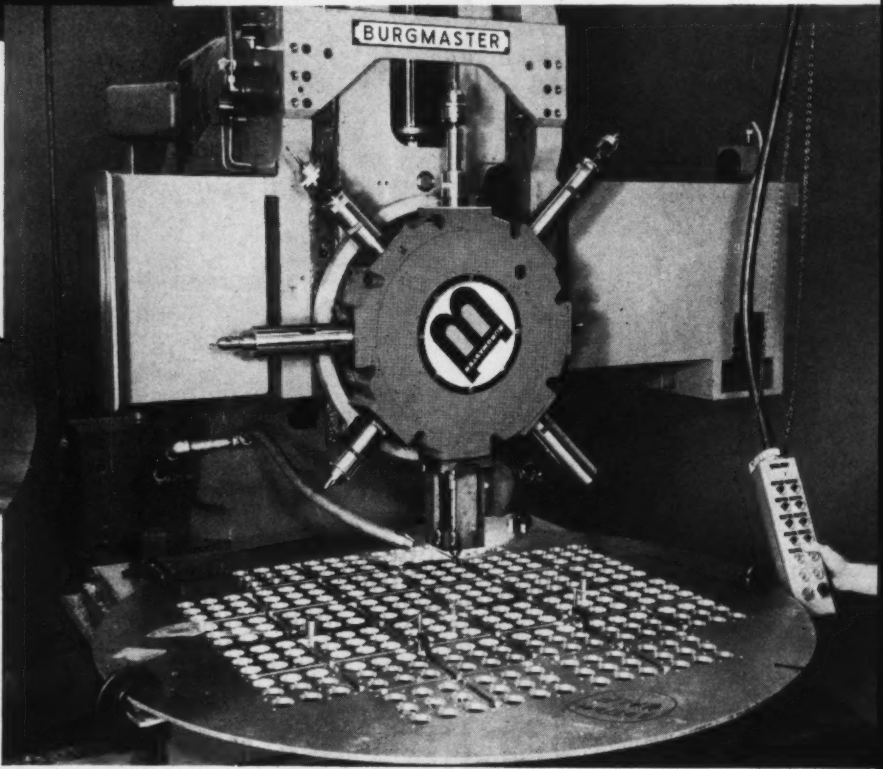
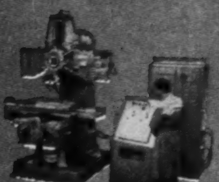
GENERAL ELECTRIC USES Burgmaster TAPE

- Production Speeded from 8 Weeks to 9 Days
- Saves 60 Hours of Lead Time
- $800.00 Fixture Eliminated

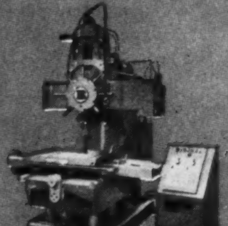




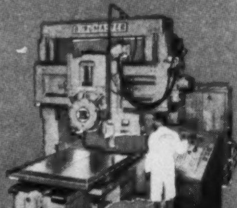
Burgmaster Model 3BHT
8-spindle, 1½″ capacity in steel. Table travel 20 x 30, 30 x 45.



Model 25AHT
6-spindle, 1¼″ capacity in steel. Table travel 15 x 26, 20 x 30, 30 x 45.



Model 2BHT
6 spindle, ¾″ capacity in steel. Table travel 10 x 18, 15 x 26, 20 x 30



Model 3BHT-B Double Housing Planer Type
8-spindle, 1½″ capacity in steel. Table travel 48 x 60.

.... CONTROLLED TURRET DRILLS

TO PROGRAM 2,098 OPERATIONS EACH PART

(General Electric Company, Atomic Power Equipment Dept., San Jose, Calif.)

● *Tape-Controlled milling operations* are now added to the versatility of the Burgmaster Model 3BHT, 8-spindle tape-controlled Turret Drills. At General Electric's San Jose facility, 10 slots .176″ wide and 3½″ long, and 24 slots ⅜″ wide and 10″ long are milled in a 6061-TC aluminum nuclear reactor grid plate ⅜″ thick. These milling cuts are rough and finish, both sides, and are all programmed in tape. 1962 additional center drill, drill, bore, ream and tap operations necessary to complete each unit are also programmed in tape and performed by the Burgmaster Model 3BHT with push-button control. All holes are held to .004″ true position over entire area. In this operation, production has been speeded from 8 weeks to 9 days, 60 hours of lead time have been saved and an $800.00 fixture eliminated.

JOB FACTS

Company: General Electric, Atomic Power Equipment Department, San Jose, California.

Machine: Burgmaster Model 3BHT—"GENERAL ELECTRIC MARK II" Tape-Controlled Turret Milling, Drilling, Tapping and Boring Machine.

Part: Nuclear Reactor Grid Plate, ⅜″ x 55½″ diameter.

Special Attachments: Milling, Reciprocating Drilling, 3-Dimensional.

Lot Size: 2

Tolerance: .004″ of True Position Over Entire Area.

Holding: 2 Pins on Sub Plate, Simple Clamps.

Machine Operations: Total 2,098 Machine Operations.

288 holes—center drill, drill, bore and ream (4)
384 holes—drill (1)
128 holes—drill and tap (2)
60 holes—drill and bore (2)
50 holes—drill (1)
10 slots—mill, rough and finish both sides (4)
24 slots—mill, rough and finish both sides (4)

Former Method: Individual Milling and Drilling Machines with Drill Fixtures.

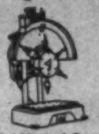
Present Method: All operations programmed in tape for Burgmaster Model 3BHT.

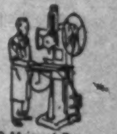
Savings: 31 Days, 60 hours lead time, $800.00 fixture.

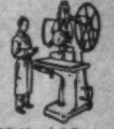
Other Advantages: Greater Accuracy, Less Cost. No Scrap Loss, Eliminates Operator Fatigue.

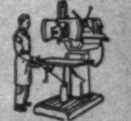
Circle Service No. 270

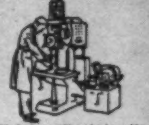
World's Largest Builder of Turret Drilling Machines

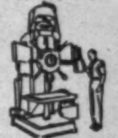

"O" Manual Power Index ¼″ Capacity

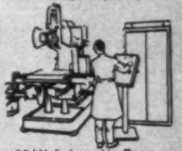

1C Manual Power Index ⅜″ Capacity

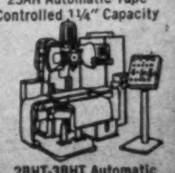

2B Manual Power Index ¾″ Capacity


2BR Ram Type Radial Drill ¾″ Capacity


2BH Automatic Hydraulic ¾″ Capacity


3BH Automatic Hydraulic 1½″ Capacity


25AH Automatic Tape Controlled 1¼″ Capacity


2BHT-3BHT Automatic Tape Controlled ¾″ and 1½″ Capacity

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Send for Literature

Write for bulletin describing Burgmaster 6 and 8 Spindle Tape Controlled Turret Drilling, Tapping and Boring Machines. Forty minute 16 mm sound film showing all Burgmaster Turret Drills in operation is available without charge from any office.

LINE GUARD

Amchem's new program to insure the highest uniform quality from Amchem's metal treating processes

LINEGUARD is Amchem's industry-wide program for providing automatic sensing and control equipment as an integral part of many of Amchem's metal treating products and processes—cleaners, etchants, chromates and phosphates for spray or dip application.

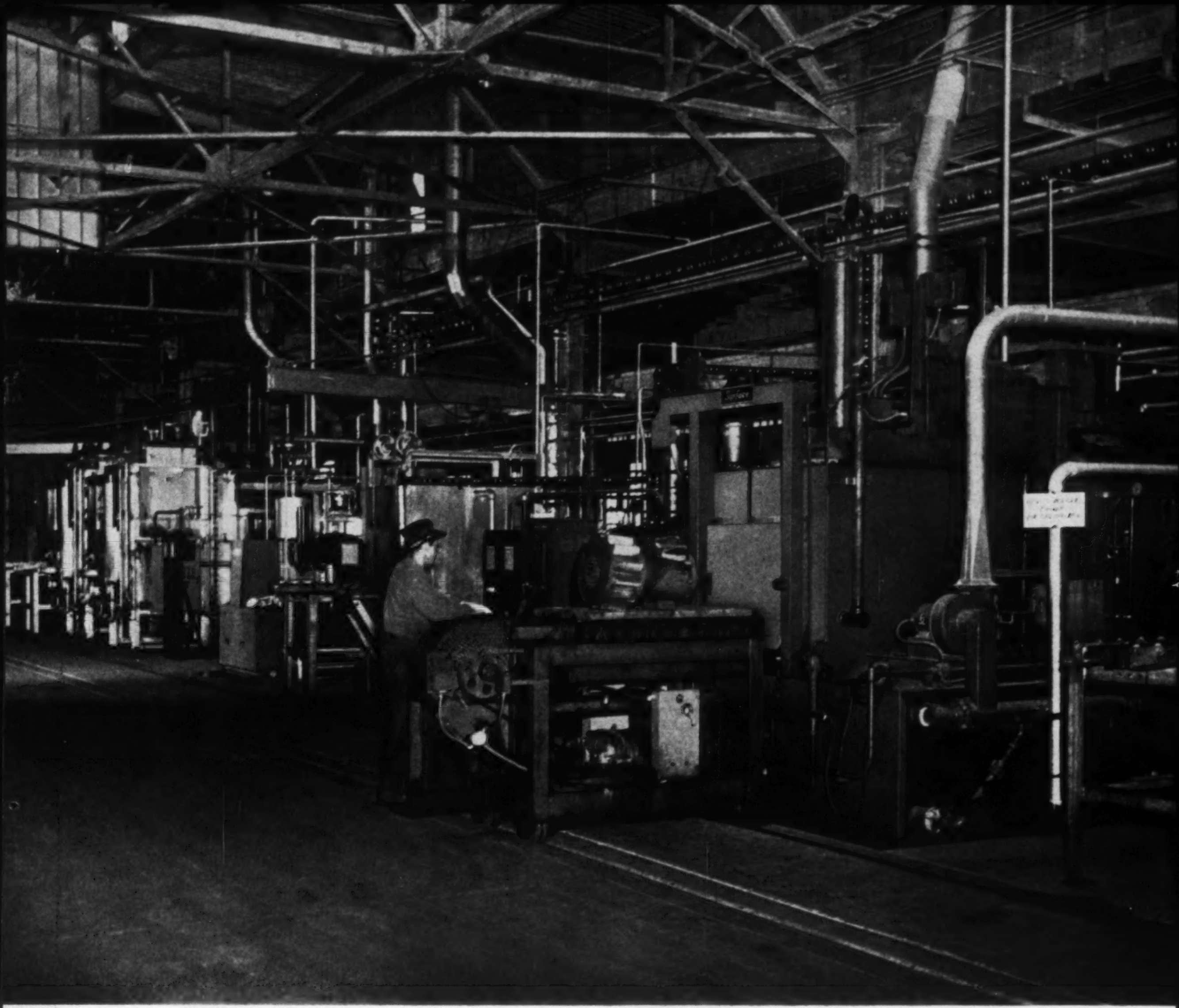
AMCHEM LINEGUARD functions as an electronic watchdog on your pre-paint process, takes all the guesswork out of providing *sustained* uniformity of coating throughout the workday; eliminates previously costly maintenance and control procedures, releases personnel to more productive tasks.

AMCHEM LINEGUARD—if you fabricate and coat metals, remember the name! It's your key to a new kind of quality control that assures greater coating uniformity, substantial dollar savings in maintenance and manpower.

AMCHEM LINEGUARD is practically a necessity if your operation is geared to high volume, mass production output. For maximum quality at minimum cost ask your local Amchem Representative about LINEGUARD, or write direct to Amchem where metal protection means more than just chemicals!

AMCHEM **AMCHEM PRODUCTS, INC.**

Amchem is a registered trademark of
AMCHEM PRODUCTS, INC. (Formerly American Chemical Paint Co.)
AMBLER, PA. • St. Joseph, Mo. • Niles, Calif. • Detroit, Mich. • Windsor, Ont.



Batch type furnaces form mechanized heat treat line

At The Harnischfeger Corporation, one man can supervise a group of standard heat treat units linked with a shuttle buggy which moves parts quickly and easily from process to process.

Production rate is 460 net pounds per hour of pinions, gears, rollers, shafts, and pins. Chief reason for this is the Surface atmosphere Allcase® furnace. No matter how dense the load, this Power Convection furnace automatically hardens and delivers parts with uniform quality.

Other standard Surface units include two tempering furnaces, two atmosphere generators, and an Autocarb® system which automatically controls the carbon content of gas atmosphere.

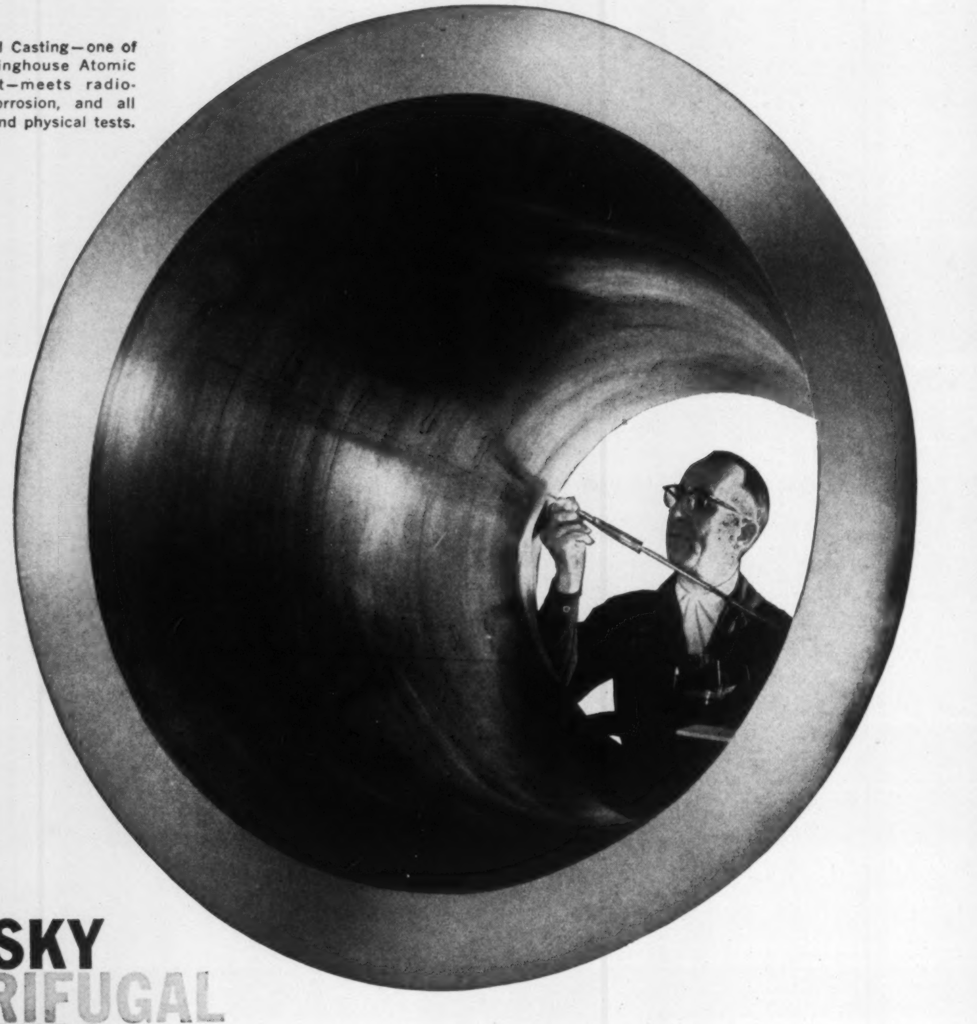
Write for information: 2373 Dorr St., Toledo 1, Ohio. In Canada: 2490 Bloor St., West, Toronto.

Check our latest developments
at the Metal Show, Oct. 23-27,
in Detroit's new Cobo Hall

SURFACE

SURFACE COMBUSTION, Toledo 1, Ohio / a division of Midland-Ross Corporation

This Sandusky Centrifugal Casting—one of four produced for Westinghouse Atomic Equipment Department—meets radiographic, intergranular corrosion, and all other rigorous chemical and physical tests.



ONE SANDUSKY CENTRIFUGAL CASTING ... makes 4 giant stator shells

Specified by Westinghouse for 4 canned motor pumps soon to be integral parts of reactor system in Yankee Atomic Electric Plant in Rowe, Massachusetts

One king-size 17-ton Sandusky casting supplied the main motor bodies (stator shells) for the four pumps being built by Westinghouse, each to handle 23,600 g.p.m. of pressurized water through the reactor core.

The 25-foot-long Sandusky casting was centrifugally spun of a modified CF-8 (Type 304 L) stainless steel, then machined by Sandusky to a 3″ wall thickness, 31½″ on the O.D. This huge casting was hydrostatically tested to 3800 psi before being sectioned into four 68″ lengths.

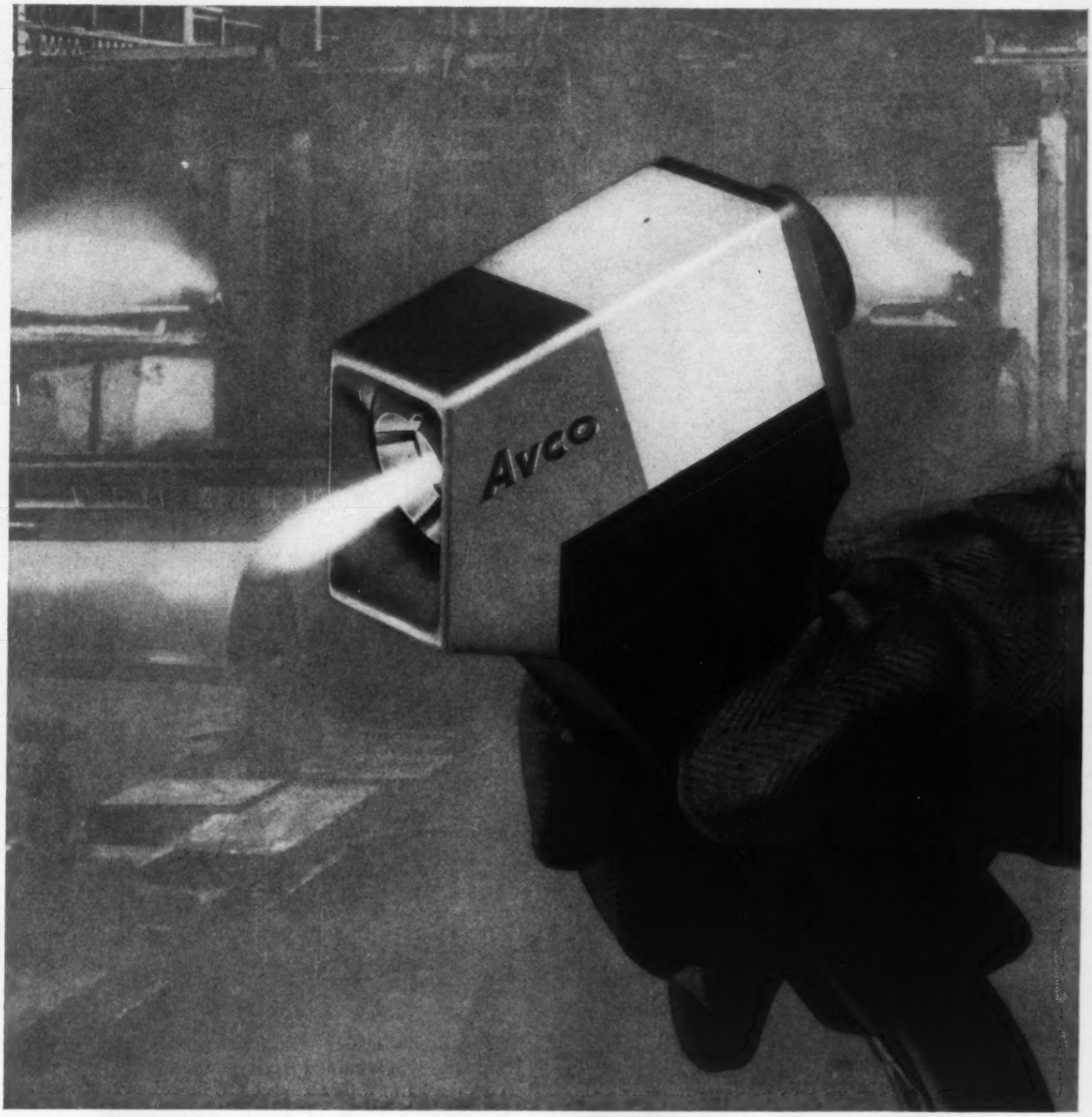
These stator shells represent another *new and exacting application* for Sandusky Centrifugal Castings—which may offer a practical and economical answer to *your* cylindrical requirements also. They are available in diameters from 7″ to 54″—in lengths up to 33 feet—in heat- and corrosion-resistant stainless, carbon and low-alloy steels and a wide range of copper-base and nickel-base alloys.

Let us show you how Sandusky Centrifugal Castings can help solve your cylindrical problems. Write to us at Sandusky, Ohio.

SANDUSKY CENTRIFUGAL CASTINGS

SANDUSKY FOUNDRY & MACHINE CO.

SANDUSKY, OHIO **Stainless, Carbon, Low-Alloy Steels—Full Range Copper-Base, Nickel-Base Alloys**



Avco puts the PlasmaGun to work—in your plant

This Avco PlasmaGun spray-coats metals, ceramics and refractories with a thickness, density and bond strength never before possible—right on your production line.

It sprays uniformly without clots or streamers at roughly half the cost of other plasma equipment. And you can save up to 30% over conventional spray-coating—even more when fabricating free-standing parts from materials such as tungsten.

The Avco PlasmaGun takes powders previously too fine for other plasma equipment. The cathode is adjustable, too, for convenience and economy. (No need to switch cathodes each time you change powders.)

The cost? Lower than you think. It can pay for itself on the first job. Maintenance? Easiest of any gun in the field. (The PlasmaGun assembles with only 4 bolts!) Warranties? On all parts, for six months. (Another exclusive Avco feature.)

AVCO
Research & Advanced Development
division

Avco's special PlasmaGun booklet describes the complete system. Send for your free copy right now!

AVCO Research and
Advanced Development Division
Dept. 10-2, Wilmington, Mass.

Please send free information about new PlasmaGun system.

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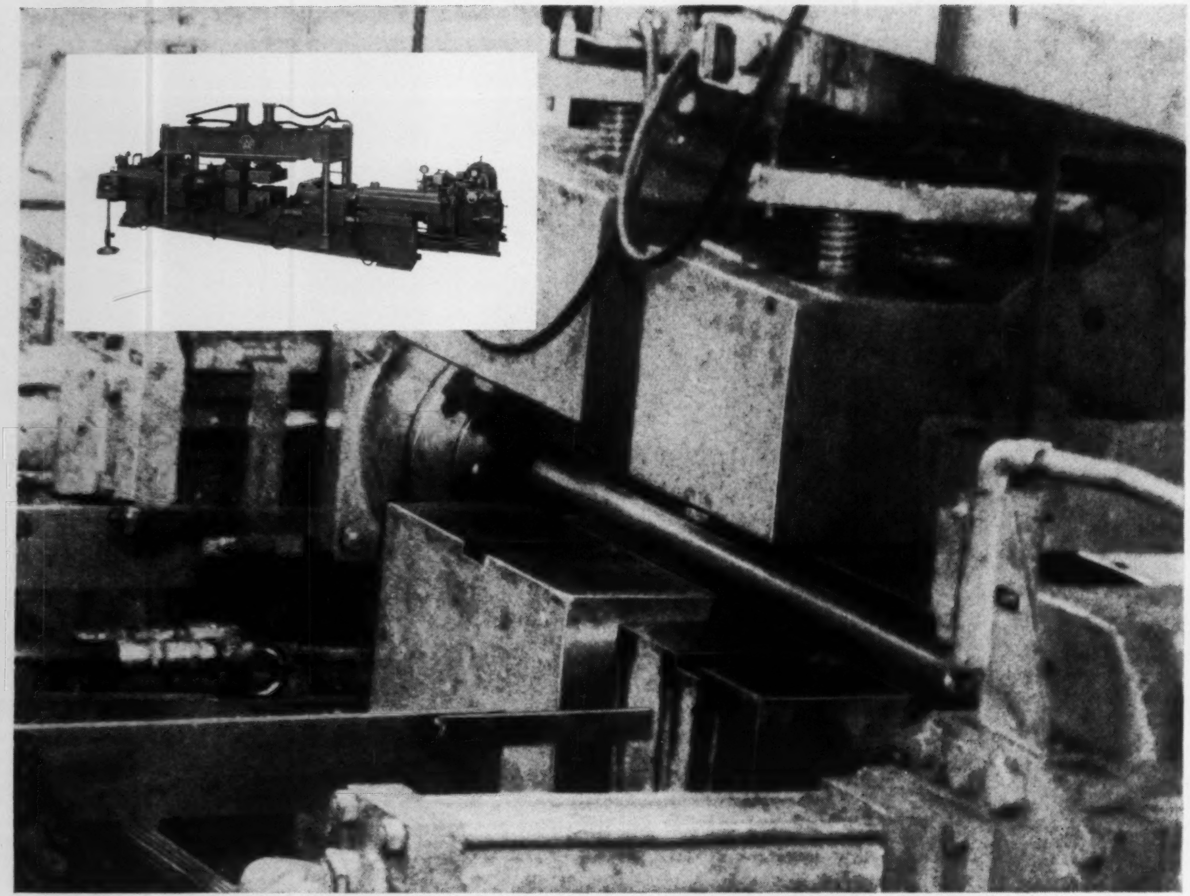

Williams-White Special Tube Reducer in major automotive plant.

Custom Designed -- Fully automatic Williams-White TUBE REDUCER

PROBLEM: Design a machine capable of handling torque tubes to $5\frac{1}{2}''$ in diameter with a single or double *reduction* or *expansion* operation for *either* or *both* tube ends.

Williams-White engineers tackled this problem, applying the engineering knowledge gained in designing many similar pieces of metal-forming equipment. Double, hydraulically actuated, sliding die heads at each end proved to be the most practical solution for a compact, high-production machine. With this design, position No. 1 may be used for the first pass on a double reduction cycle and position No. 2 for the second pass. Where only one pass is required, production is doubled by completing two parts at each pass.

Williams-White's Special Horizontal Tube Reducer will complete one cycle every 7 seconds using a 6″ stroke of the die heads. Maximum production rates are maintained by the utilization of fully automatic loading and unloading equipment.

An example of the wide scope of design and manufacturing capabilities at Williams-White, this special machine illustrates the practical application of engineering know-how gained through the building of metal forming equipment for more than a century. Discuss all of your metal forming applications with experienced W-W engineers.

WILLIAMS-WHITE & CO 600 Third Avenue, Moline, Ill.

the measure of Performance Reliability for more than a century

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EXOTIC
BALDWIN BLH LIMA-HAMILTON
STEELS
FROM STANDARD

Official USAF photo

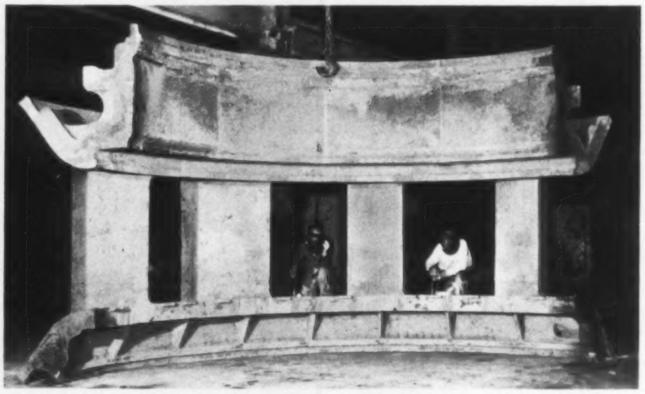
Space-Age forgings and rings to meet the most severe conditions of temperature environment and stress? Talk to Standard. We have been known in the trade for more than a century and a half as tops in quality and service. Tie *your* requirements to the experts on "can't be done" requirements.

Electric furnace, vacuum degassed steel, vacuum remelted alloys, aluminum and titanium forgings for rockets and missiles—produced under the most modern technical controls—as the trade has learned to know, that's the "specialty of the house" at Standard.

QUALITY CONTROL IS SECOND TO NONE AT STANDARD. Quality control at Standard is maintained by the most accurate, up-to-date testing equipment available. Laboratory facilities operate day and night to support our metallurgists, shop foremen, mill and machine operators—as well as plant management and, of course, our customers.

STANDARD'S OPEN-DIE FORGINGS SUPPLY NATION'S LEADING INDUSTRIES. Steel and nonferrous alloys can be worked in Standard's forge shop, including some hard-to-work metals such as titanium and super alloys. It can turn out forgings from 15 to 52,000 lb.; up to 45 inches in diameter; and up to 60 ft. in length. Major products include rotors and wheels for turbines, propeller shafts for ships, rolls for sugar, printing and rubber industries.

Standard's hundreds of customers represent every major industry in the world. Metal components of carbon and alloy steels, super alloys, and nonferrous alloys such as aluminum and titanium are supplied by Standard for an endless line of products. What particularly impresses our customers however, is the unique, personalized service we provide. See for yourself—bring your next problem to Standard.



STEEL CASTINGS TO VIRTUALLY ANY SPECIFICATIONS. The Standard foundry, one of the larger ones in the country, has turned out castings as light as 1 lb., and ranging up to 85,000 lb. They include some of the largest heads ever cast for dredge cutters and also vital components in huge hydroelectric projects throughout the world. Standard yields to none in the skill of its foundry engineers, metallurgists, molders, coremakers and core setters.

PIONEERS IN ROLL-FORGED RINGS . . . STANDARD. Standard's craftsmanship in forming metal rings for heavy industry dates back to 1856. The first all-forged weldless rings were produced in volume for the first time in 1870—at Standard. And much of the development work in forging weldless rings of high-alloy steels, aluminum and titanium has been done in Standard's Ring Department.

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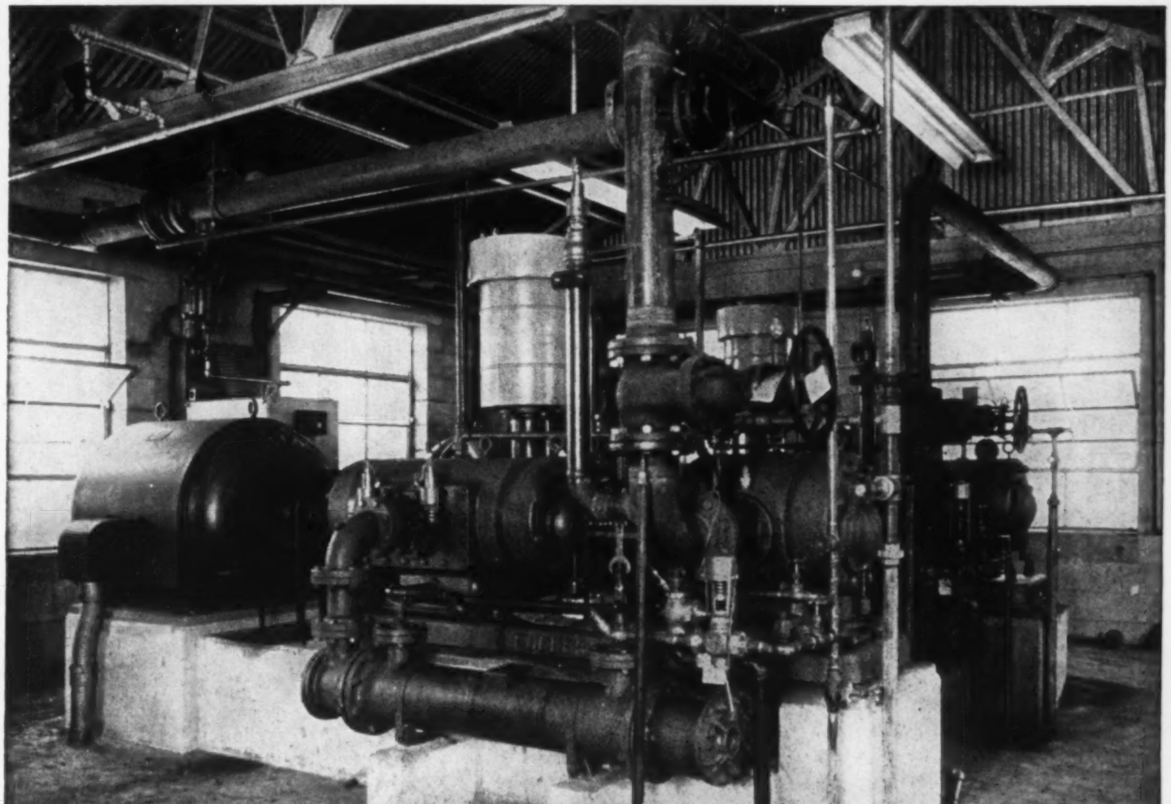
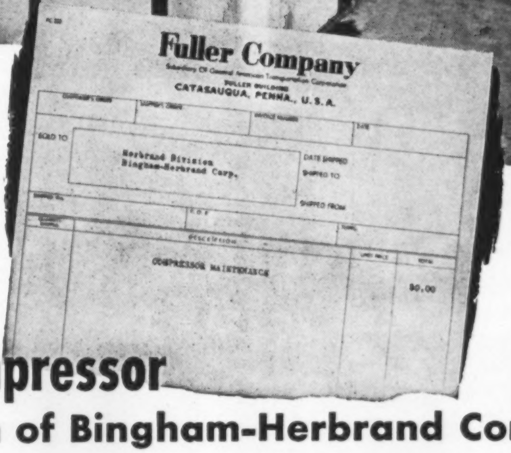


Two C135/135H Fuller Rotary Compressors at the Herbrand Division of the Bingham-Herbrand Corp., Fremont, Ohio, leading manufacturer of forged mechanics' hand tools and steel forgings for the automotive industry. Each compressor is rated 680 cfm, atmosphere to 100/110 psig., at 690 RPM.



Fuller Company

Subsidiary Of General American Transportation Corporation

FULLER BUILDING

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Bingham-Herbrand Corp.

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SHIPPED TO

SHIPPED FROM

F.O.B.

TERMS

DESCRIPTION

UNIT PRICE

TOTAL

COMPRESSOR MAINTENANCE

$0.00

Here's the 4-Year Maintenance Bill on Fuller Rotary Compressor

at Herbrand Division of Bingham-Herbrand Corp.

So satisfactory was the performance of its first Fuller Rotary Compressor, installed in 1956, that Herbrand Division installed another like it 3½ years later.

When the older unit was inspected after four years operation, no replacement of parts was necessary. After installation of a new gasket (cost $9.35)—to replace the one that had to be removed to make inspection—the compressor continues to add to its service record.

The newer compressor has also been entirely trouble-free, and Herbrand plans a third, when increased air capacity is required. It, too, will be a Fuller—for, as Herbrand says, "These compressors can be classified as maintenance-free."

Because Fuller Rotary Compressors are practically vibration-free, they can be installed without complicated or expensive foundations or structural modifications. They are simple and efficient, with no valves to leak, no seats to grind. Blades automatically compensate for wear. They have forced-feed lubrication to all parts within the cylinder. Rotor, bearings and blades are the only moving parts.

Fuller Compressors range from 30 to 3300 cfm, pressures to 125-lb. gauge.

Write for Bulletin C-5A. It tells the whole story.

See Chemical Engineering Catalog for further details and specifications.

FULLER COMPANY GENERAL AMERICAN TRADE MARK

FULLER COMPANY
122 Bridge St., Catasauqua, Pa.
Subsidiary of General American Transportation Corporation
Offices in Principal Cities Throughout the World

Fuller
....pioneers in harnessing AIR

2852
C-364

A gallery of modern reversing mills . . . by BLISS SALEM, OHIO

Versatile and fast, Bliss reversing 4-high cold reduction mills roll much of the world's strip steel. Some typical recent installations are shown here. Write today for our 84-page portfolio of rolling mills and auxiliary equipment—Bulletin 40-B.

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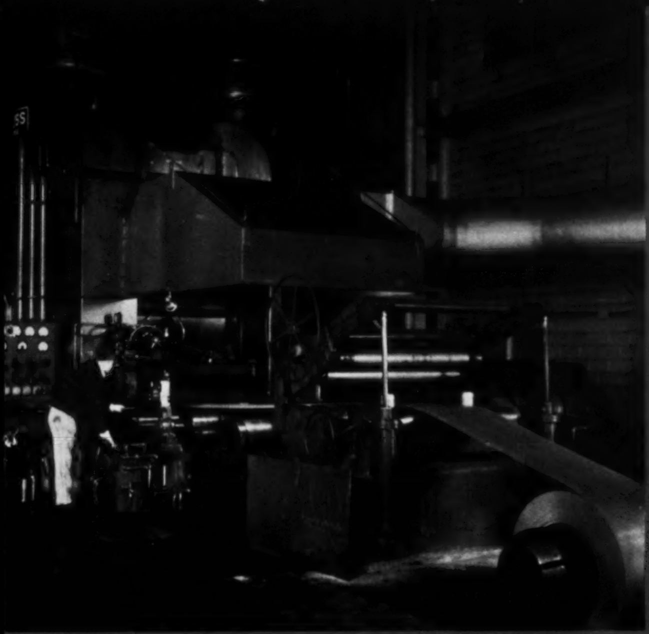
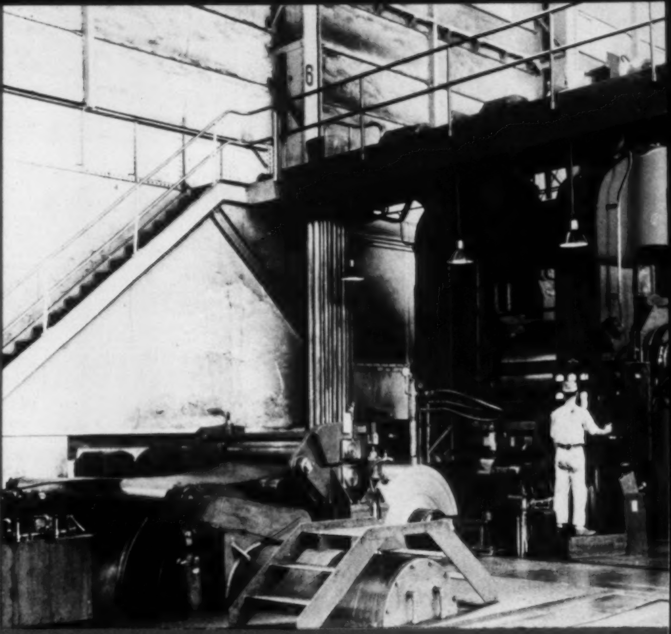
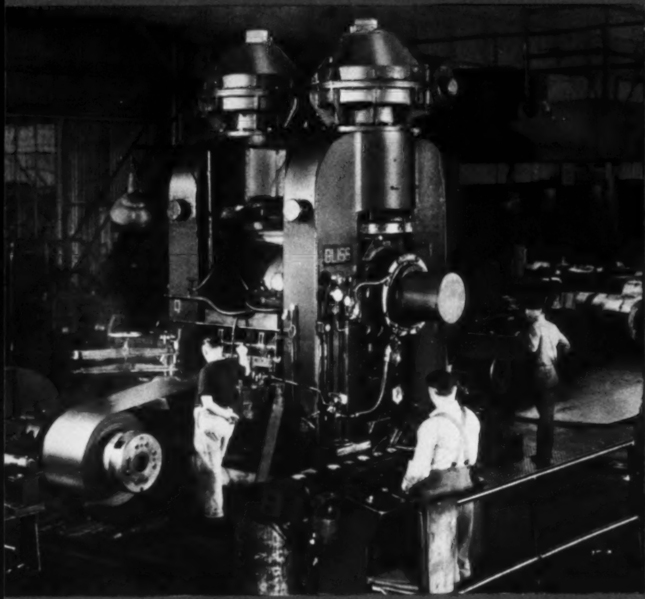
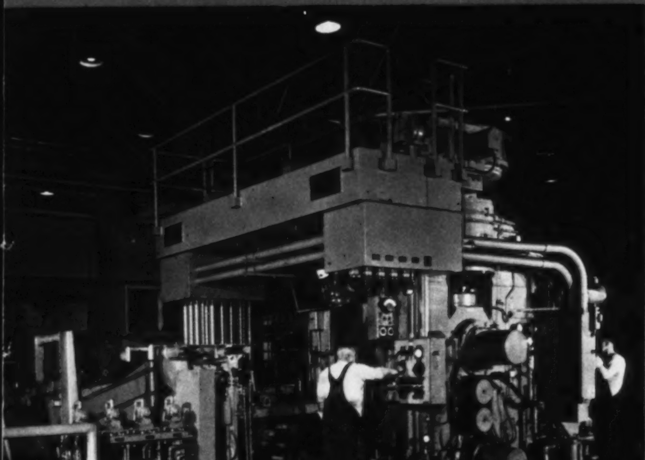
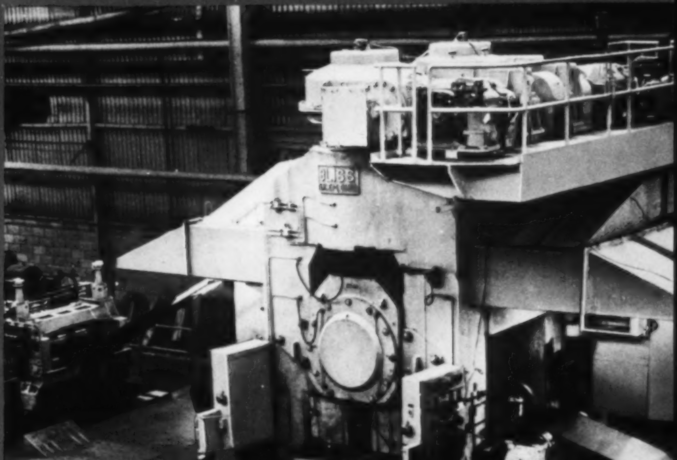










ANNOUNCING A NEW IDEA IN BRONZE BUSHED BEARINGS ...A PRECISION LINER THAT IS REPLACEABLE ON THE JOB!

❶ Precision bronze liner, replaceable without removing shaft or bearing base.

❷ Rugged semisteel housing to withstand heavy shock loads. (Ductile iron or steel to order.)

❸ Bottom of base machined for perfect alignment; close tolerance held to center of bore.

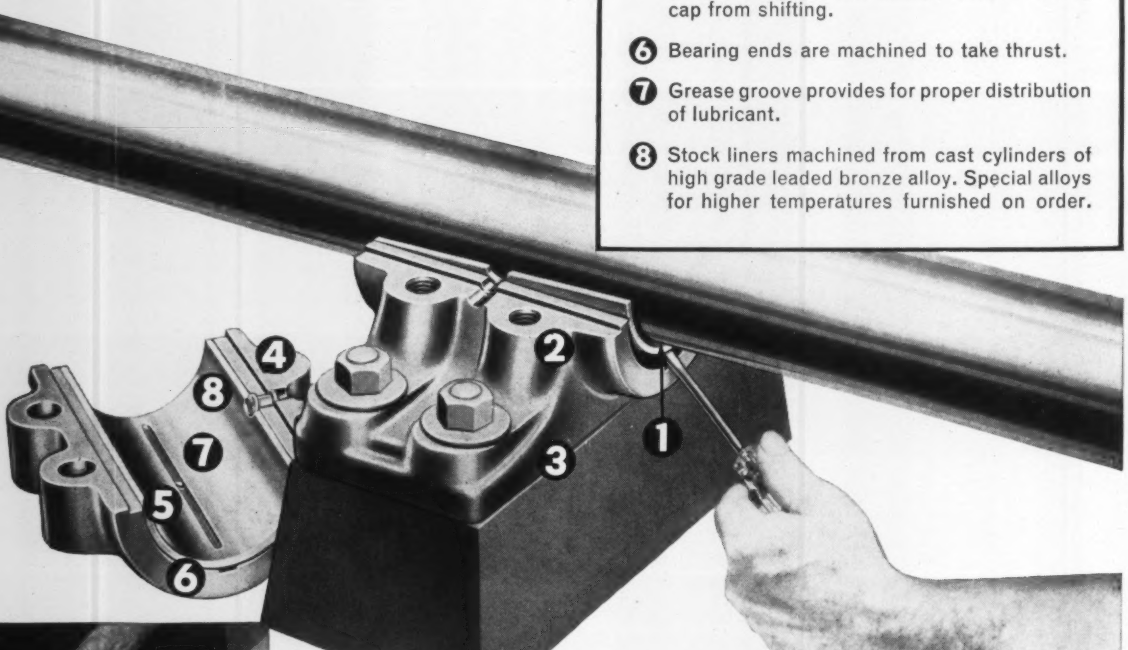
❹ Brass spool locks both halves of bronze liner —prevents lateral movement and rotation. No pins, no screws. (Patent applied for.)

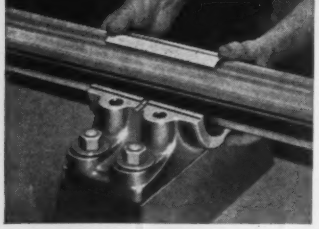
❺ Tongue-and-groove joint in 4-bolt base sizes (fitted bolts in smaller sizes) prevents bearing cap from shifting.

❻ Bearing ends are machined to take thrust.

❼ Grease groove provides for proper distribution of lubricant.

❽ Stock liners machined from cast cylinders of high grade leaded bronze alloy. Special alloys for higher temperatures furnished on order.



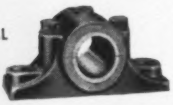


Now! Pop out the Old . . . Wring in the New!

This new idea in quality bronze bushed bearings for heavy loads, high temperatures and corrosive conditions minimizes loss of downtime and hard work of replacing liners. Simply relieve shaft pressure, remove the old liner and roll in the new. No premium price. Ask your local Dodge Distributor. Or write us for bulletin.

Dodge Manufacturing Corporation
800 Union Street, Mishawaka, Indiana

SPLIT BRONZE BUSHED JOURNAL BEARINGS — $1\frac{15}{16}$" to $2\frac{15}{16}$"



RIGID BRONZE BUSHED PILLOW BLOCKS — $3\frac{7}{16}$" to 8"

ANGLE BRONZE BUSHED PILLOW BLOCKS — $1\frac{15}{16}$" to 8"

DODGE

of Mishawaka, Ind.

CALL THE TRANSMISSIONEER — your local Dodge Distributor. Factory trained by Dodge, he can give you valuable help on new, cost-saving methods. Look under "Dodge Transmissioneer" in the *white* pages of your telephone directory, or in the yellow pages under "Power Transmission Machinery."

STANDING GUARD FOR LIGHTS THAT NEVER FAIL

Standing guard at power stations is a natural for Whiting cranes. They're pulling this kind of duty throughout the land, every day. They help to maintain the uninterrupted service that sends billions of kilowatts to American Industry — keeps industrial plants humming, homes and streets lighted and safe.

The thirty ton crane *above* now safeguards maintenance at the Black Hills Power and Light Company's new generating plant at Rapid City, South Dakota.

For servicing a power station or speeding up materials handling in mills and factories, you'll find the right crane at Whiting for the job. We'd like to talk to you about giving your company a better lift. Write *Whiting Corporation, 15601 Lathrop Ave., Harvey, Illinois.* In Canada: *Whiting Corporation (Canada) Ltd., 350 Alexander Street, Welland, Ontario, Canada.*

Ask for bulletin: "How to Select An Overhead Traveling Crane."

See our catalog in Sweets

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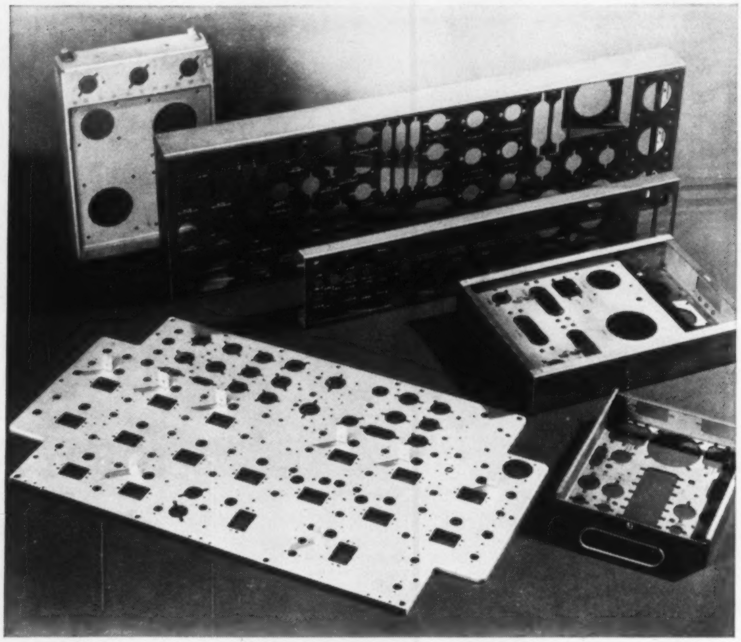
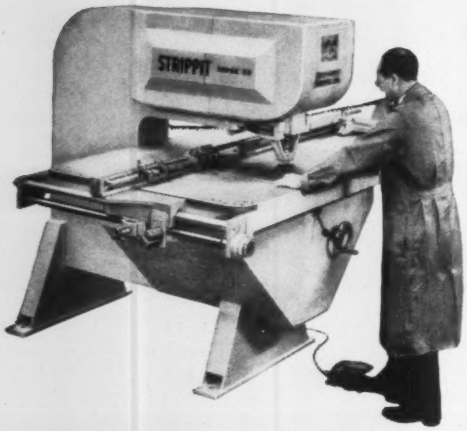


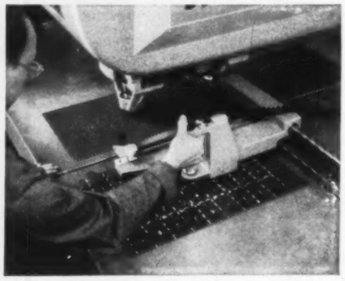
PUNCH COMPLICATED PATTERNS FAST WITH STRIPPIT FABRICATORS



SUPER 30. Handles flat or formed workpieces 60″ wide... any length. Both the Super 30 and the 15A punch round and shaped holes up to 3½″ diameter, to ¼″ thick material... notch 90° corners—rectangular, radii, vee and special shape edge notches—up to ⅛″ capacity... nibble straight line or contour shear up to 38″ diameter circle, at 165 strokes a minute in ⅛″ material.

STRIPPIT DUPLICATOR

For low cost production runs on the Super 30 or 15A, the STRIPPIT Duplicator functions like a pantograph to reproduce any hole pattern from a drilled or punched template. No custom dies needed to turn out precision sheet metal parts.



NEW 15A. Designed for workpieces up to 30″ wide... any length... the new 15A Fabricator offers all the speed and accuracy of the Super 30. Each machine, with its own universal tool holder, makes it possible to interchange standard and special tools in seconds to minimize down-time. Flat punched parts produced require no deburring. Multi-stop micrometric gaging system positions work rapidly to exact layout specifications.

WALES **STRIPPIT** INC.

202 Buell Road • Akron, New York

A UNIT OF HOUDAILLE INDUSTRIES INC

In Canada: Strippit Tool & Machine Company, Brampton, Ont.; In Continental Europe: Raskin, S. A., Lausanne, Switzerland; In the British Isles: Kearney & Trecker—C. V A. Ltd., Hove, Sussex, England

New Roebling Wide Width Tempered Spring Steel makes the most of a good thing

. . . (your money, for instance!)

You count your profits in the number of holes in your scrap. And spring steel that doesn't measure up to the most good parts per inch just isn't the right steel for you.

That's why everybody's talking about new Roebling tempered, cold rolled spring steel. Comes in *any* width up to a full handspan wide. 8⅜ inches, that is, by .005 to .062 inches thick. Think how useful that unique extra width can be in getting extra blanks from a length of steel! The thickness is consistent, too.

Now pick a finish — any finish — blued, straw, or bright — plain or ground, Roebling's got it. Buy Roebling Cold Rolled Spring Steel and you get uniform excellence in temper and finish. Delivery? No problem at all. Get full facts and figures by writing Roebling's Wire and Cold Rolled Steel Products Division, Trenton 2, New Jersey.

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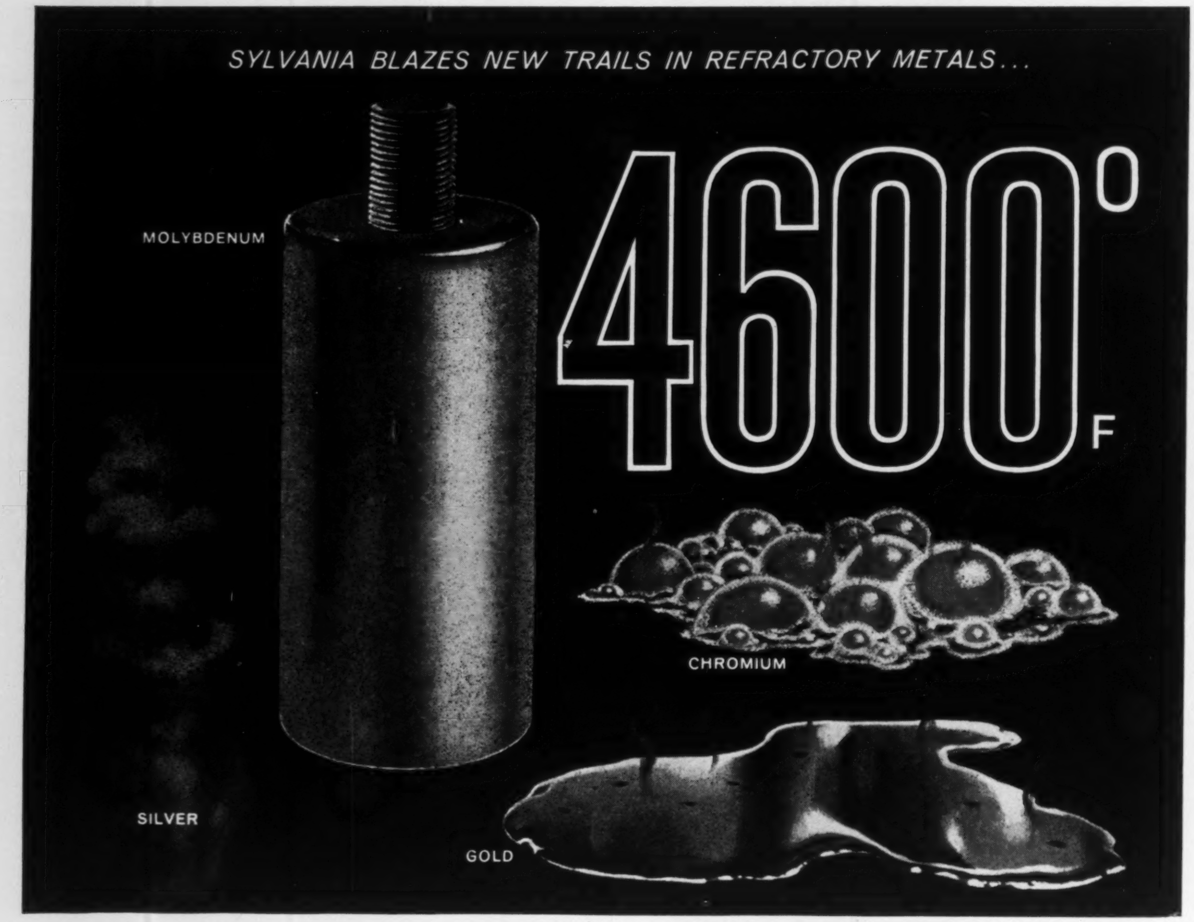
The Colorado Fuel and Iron Corporation



SYLVANIA FIRES POINT-BLANK

... at transforming research for the military into tools for industry

At 4600°F. gold turns to liquid. Chromium boils. Silver vaporizes. But molybdenum stays solid.

At Sylvania, such high temperatures help our scientists turn defense research on tungsten and molybdenum into practical answers for industry.

For instance, not long ago we devised a new method in which refractory metals are produced as powder of controlled particle size. This powder is isostatically pressed at high pressure and then sintered at high temperatures. Result? Ingots, bars—even intricate shapes—can be produced more efficiently, with more uniform compaction.

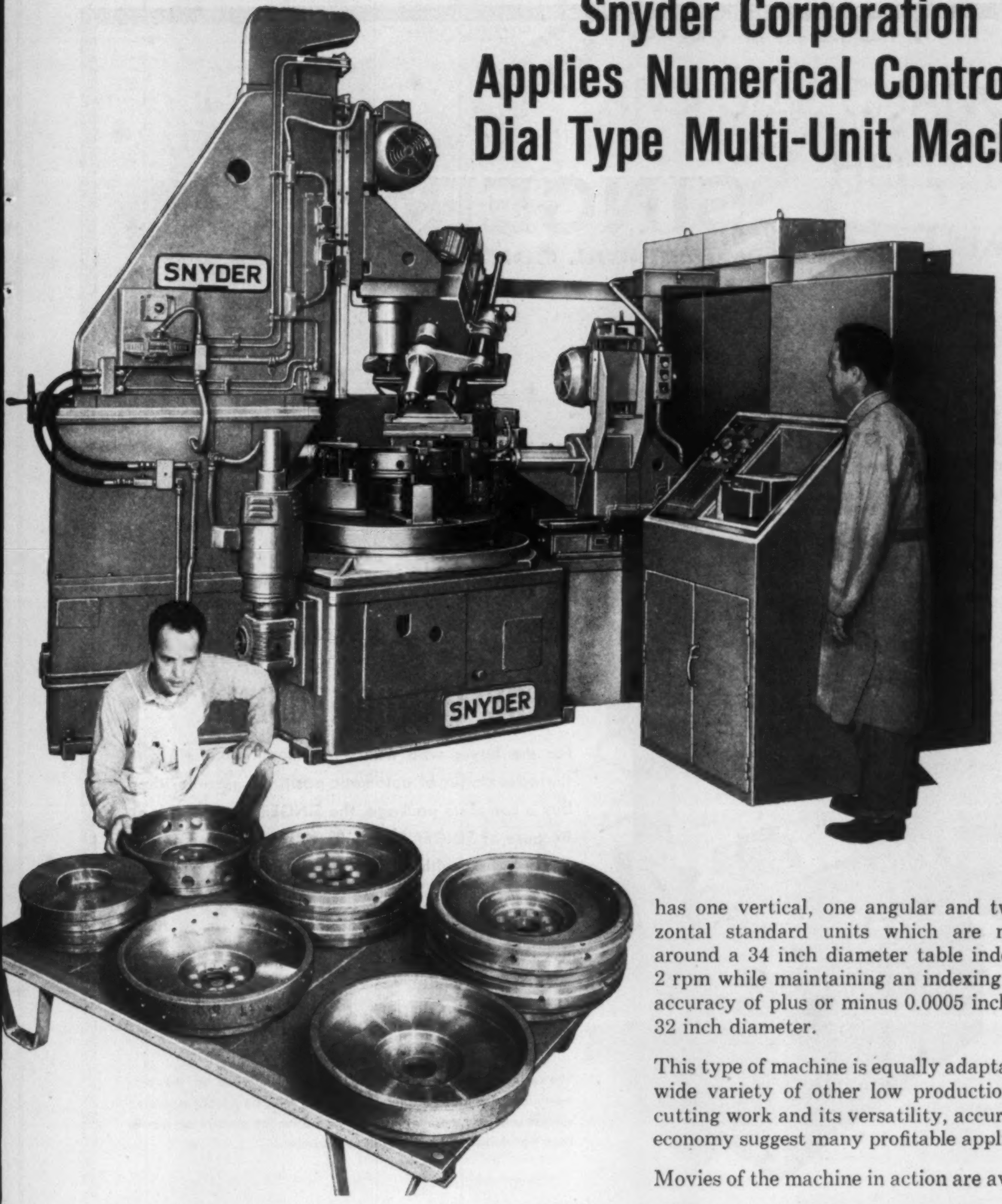
Why not take a good look at refractory metals to answer your needs. The identical properties that solve the problems of throat inserts for rockets and missiles can pay *you* dividends in die-casting dies and cores, hot-work tools, molds, and in many other ways.

Want the full story? Or experienced technical help in proving out your special ideas? Write Chemical & Metallurgical Division, Sylvania Electric Products Inc., Towanda, Pennsylvania.

SYLVANIA

Subsidiary of **GENERAL TELEPHONE & ELECTRONICS**

Snyder Corporation Applies Numerical Control to Dial Type Multi-Unit Machine



This new Snyder machine drills, reams and counterbores a wide variety of cast iron diesel fly-wheels by use of numerical controls. Fifteen different fly-wheels from 12⅝ inch to 20 inch diameter are processed with various control tapes. The wheel shown in the right foreground is unprocessed. Others are as they come from the machine, ready for assembly.

For the application illustrated, the machine has one vertical, one angular and two horizontal standard units which are mounted around a 34 inch diameter table indexing at 2 rpm while maintaining an indexing spacing accuracy of plus or minus 0.0005 inches on a 32 inch diameter.

This type of machine is equally adaptable to a wide variety of other low production metal cutting work and its versatility, accuracy and economy suggest many profitable applications.

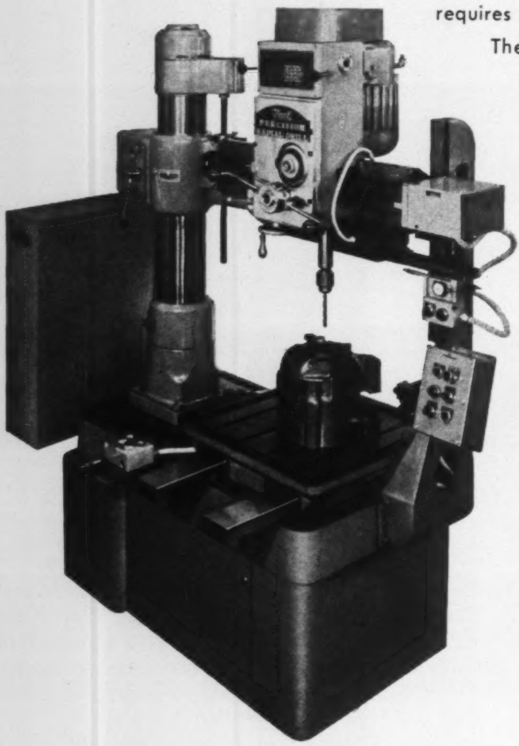
Movies of the machine in action are available.

We'll be glad to show them at your convenience. Just phone or write.

SNYDER
CORPORATION
3400 E. LAFAYETTE—DETROIT 7, MICHIGAN
Phone: LO 7-0123

SINGER*
NUMERICAL CONTROL

BUY THE COMPLETE PACKAGE... FOR THE O.E.M. . . . SINGER Numerical Control . . . the most direct approach to point-to-point positioning . . . offers speed, capacity, versatility, a high degree of accuracy . . . and is available at a low initial investment. The system is sold as a package, complete and ready for installation, including the tape reader. It requires only the measuring bars to suit the specific machine. The SINGER system offers a high degree of accuracy, for drilling, jig boring or milling . . . ±.001 inches on a work table and up to 40 inches of travel.



...OR THE COMPONENTS

For the buyer who wants to acquaint himself with the advantages of automatic positioning, rather than buy a complete package, the SINGER system is ideal. Because of SINGER'S modular design, a machine can be furnished with the automatic positioning system only. At a later date, tape control can be readily added with no sacrifice of the original investment. It is important to know, too, that all modules and motors are designed, serviced and built by Diehl Manufacturing Company, a SINGER subsidiary. Call or write for an appointment at the address below.

Shown here is SINGER Numerical Control applied to the new Veetmatic Precision Drilling Machine. This electrically-operated system provides more economical operation at greater accuracies than conventional layout drilling procedures.

Diehl†

DIEHL MANUFACTURING COMPANY
SUBSIDIARY OF THE SINGER MANUFACTURING COMPANY
Finderne Plant, Somerville, New Jersey
Telephone: Randolph 5-2200

*A Trademark of THE SINGER MANUFACTURING COMPANY
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DISTORTION AND SIZE CHANGE HELD TO LESS THAN .0002" PER INCH WITH GRAPH-AIR® TOOL STEEL

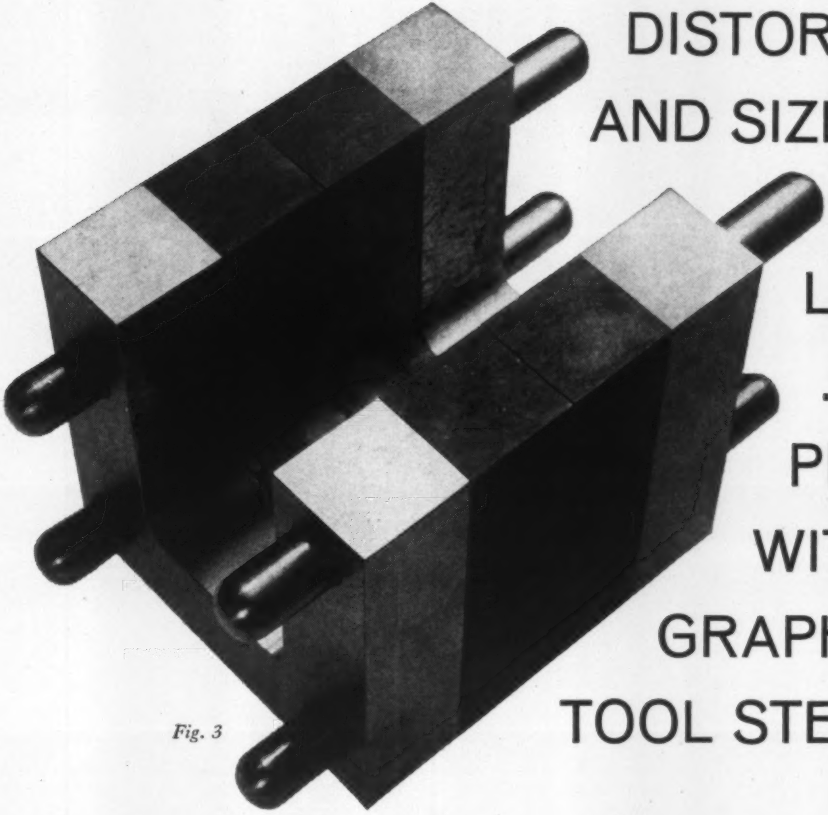


Fig. 3

The test pieces pictured here demonstrate the dimensional stability of Graph-Air® tool steel that enables users to produce more intricate tools and dies.

Fig. 1 shows test piece dimensions. In the "U" shape, which is particularly sensitive to distortion in heat treating, the machining tolerance between any two holes is held to .0002". After heat treating, the specimens are fitted together by four pins having a diameter of .0003″ under .500″. The total assembly error under these circumstances could not exceed .0008″. Distortion must be less than .0002″ per inch during heat treatment for the pins to fit.

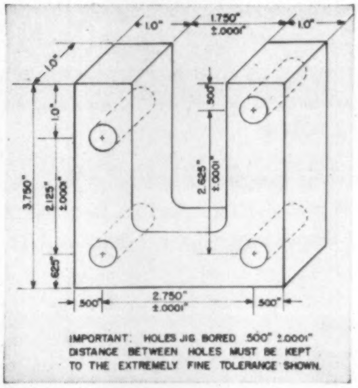

1.0"
1.750"
±.0001"
1.0"
1.0"
1.0"
.500"
3.750"
2.125"
±.0001"
2.625"
±.0001"
.625"
.500"
2.750"
±.0001"
.500"
IMPORTANT: HOLES JIG BORED .500" ±.0001"
DISTANCE BETWEEN HOLES MUST BE KEPT
TO THE EXTREMELY FINE TOLERANCE SHOWN.

Fig. 1

The Graph-Air pieces tested were from different heats. They were air hardened from 1450°F. and double tempered at 400°F. Fig. 2 shows them as they pegged together easily, demonstrating no distortion. Fig. 3 top, shows the same specimens compared with two green, or as machined, parts. They matched perfectly again. *Graph-Air did not distort . . . did not change size.* Records indicate that no other tool steel passed this test when heat treated at its recommended hardening and tempering conditions.

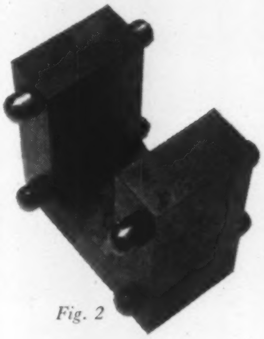


Fig. 2

Specify Graph-Air where minimum distortion and high quality are required. Solid and hollow bar sizes available. It is one of the Timken graphitic tool steels, the most stable tool steels made. The Timken Roller Bearing Company, Steel and Tube Division, Canton 6, Ohio. Cable address: "TIMROSCO". Makers of Tapered Roller Bearings, Fine Alloy Steel and Removable Rock Bits.

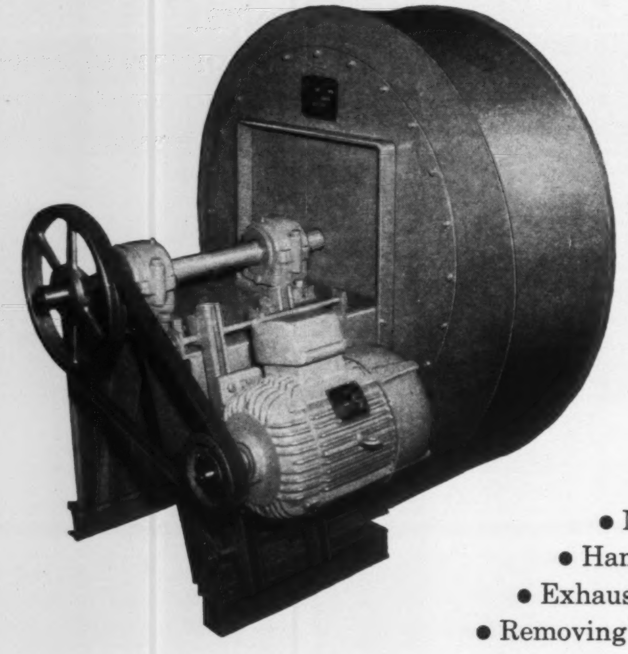
TIMKEN®
***Fine Alloy* STEEL**

TIMKEN GRAPHITIC STEELS ARE AVAILABLE FROM STEEL SERVICE CENTERS IN MORE THAN 40 CITIES IN THE UNITED STATES AND CANADA

Call on us at the National Metal Exposition, Cobo Hall, Detroit, October 23-27, Booth 739

HOW TO HANDLE SOME OF THE MOST

PUNISHING AIR JOBS



IN THE MILL

- Moving hot gases.
- Handling materials in conveyor systems.
- Exhausting corrosive fumes.
- Removing dust-laden air.

'BUFFALO' INDUSTRIAL EXHAUSTERS

Wherever you find a punishing air job, you're very apt to find a hard-working 'Buffalo' Industrial Exhauster at work. Available with highly efficient air wheel (type AW), front-flanged material wheel (type MW), or open material wheel (type OW) without front flange.

Hot gases, from 200° to 850° F., are being removed successfully by special 'Buffalo' Industrial Exhausters with shaft heat slingers.

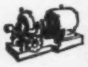
Where corrosive fumes would quickly put an ordinary fan out of service, rubber-lined 'Buffalo' Exhausters are handling them with major savings in fan replacement costs.

Next time you have a tough air moving job, call in your resident 'Buffalo' Engineering Representative. He has the experience to recommend the right fan for the job.

AIR HANDLING DIVISION
BUFFALO FORGE COMPANY
Buffalo, New York
Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

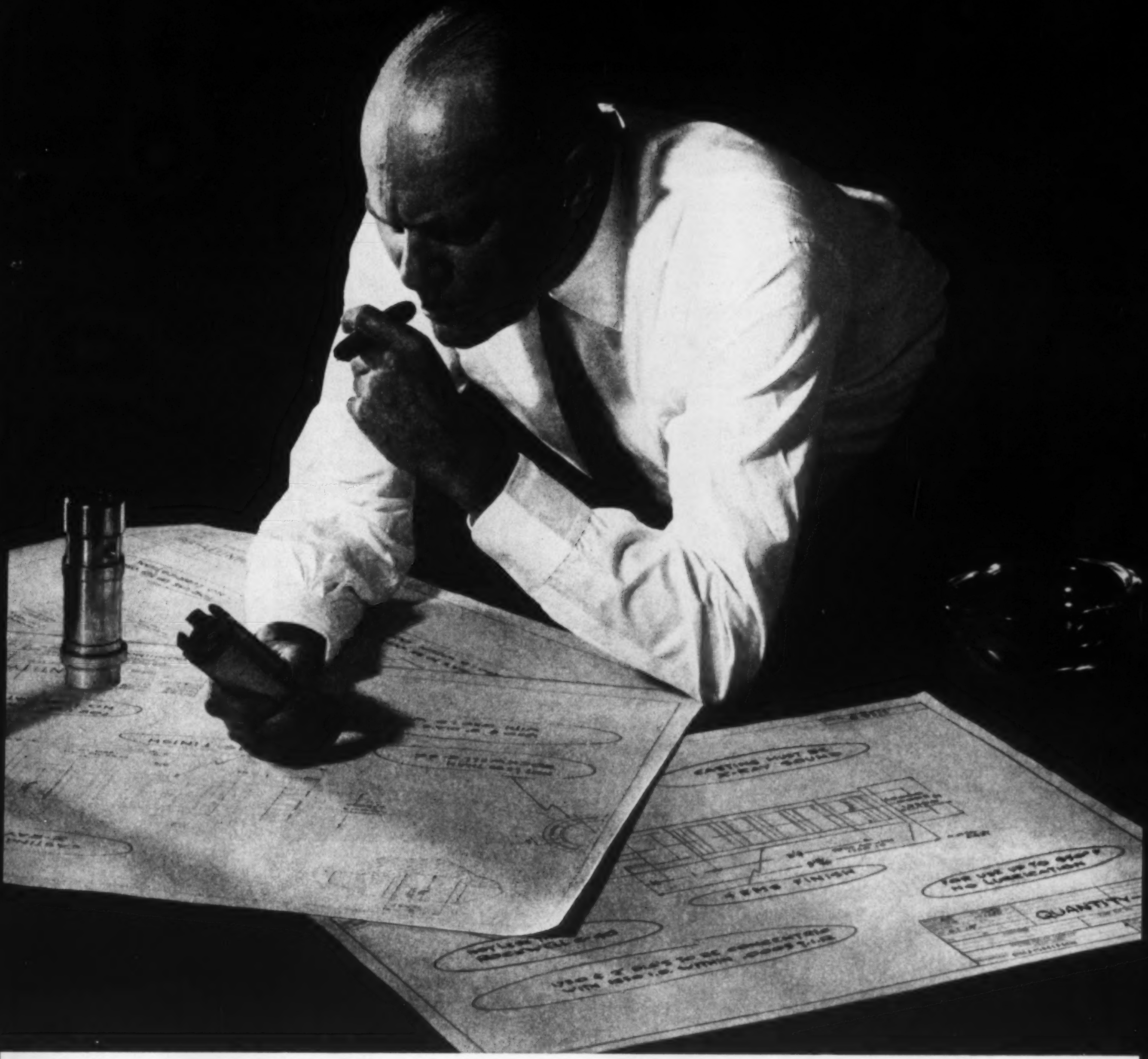
'Buffalo' Air Handling Equipment to move, heat, cool, dehumidify and clean air and other gases.

'Buffalo' Machine Tools to drill, punch, shear, bend, slit, notch and cope for production or plant maintenance.



'Buffalo' Centrifugal Pumps to handle most liquids and slurries under a variety of conditions.

Squier Machinery to process sugar cane, coffee and rice. Special processing machinery for chemicals.



I need a bushing that will last more than a month!

His problem: Metal-to-Metal wear that led to seizing and galling and then . . . quick failure. His remedy? Well, the use of a HAYNES cobalt-base alloy could be the answer.

These alloys have low coefficients of friction and are unusually long lasting under Metal-to-Metal wear conditions . . . ideal for bushings and sleeves. And they can be supplied in the exact shape, to the exact dimensions, and with the type finish needed to do the job.

But HAYNES alloys can do more than solve bushing problems. They are used universally . . . wherever metal parts that must take a beating are required. To help you get acquainted with the characteristics of these alloys, write for our 32 page book.

Address Inquiries to Haynes Stellite Company, 270 Park Avenue, New York 17, New York

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ALLOYS

HAYNES STELLITE COMPANY

Division of
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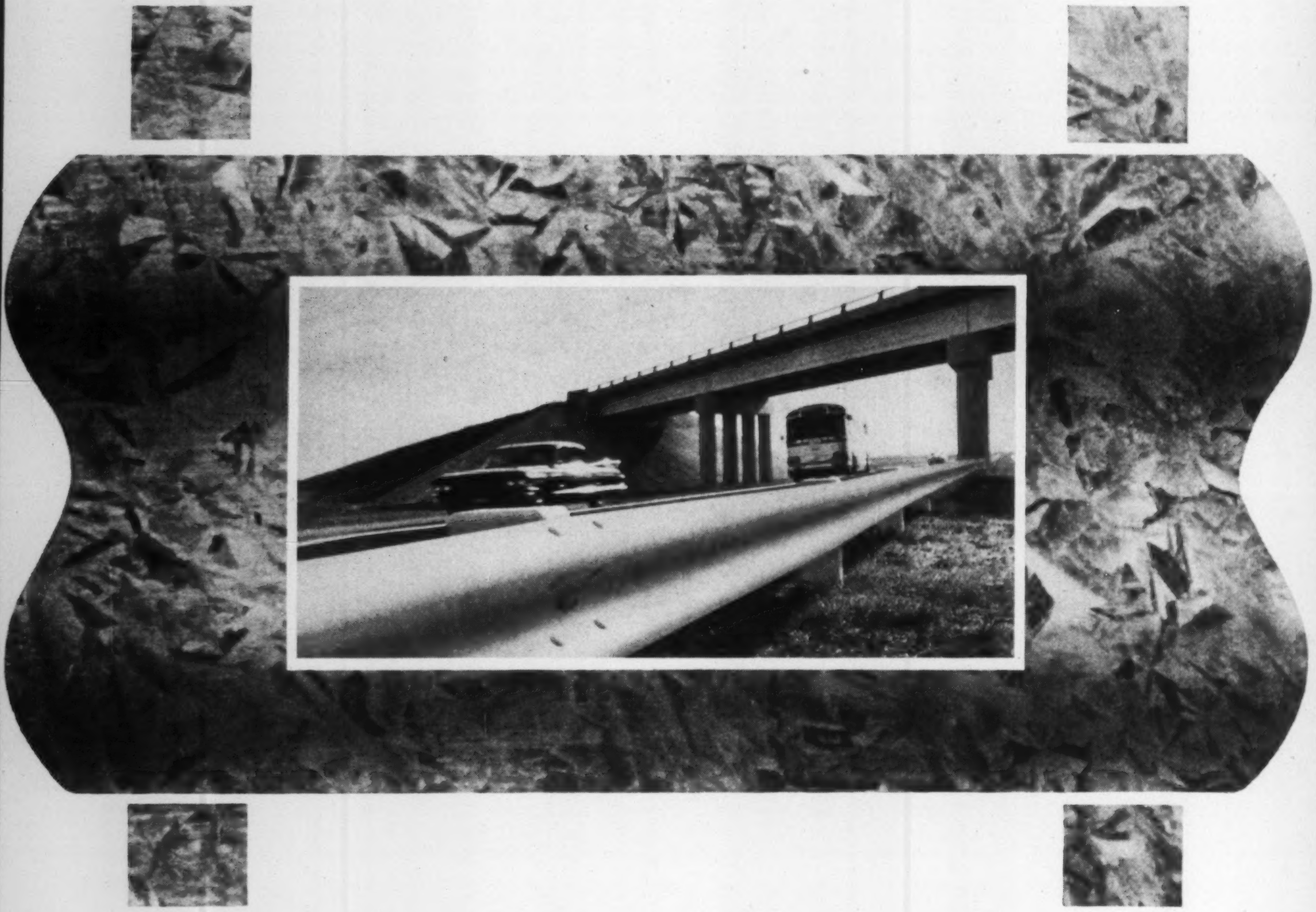
Stand-up-ability—strong reason why more and more roads are . . .



GUARDED BY GALVANIZED STEEL

Guard rails of galvanized steel are gaining favor . . . fast! Big reason: stand-up-ability . . . a neat knack of holding the line not only against impact, but also against the more gradual gnawing away that is done by time and the elements. From their inner steel core to their outer zinc coat, galvanized guard rails and median barriers stand up long and strong to deliver topmost protection with minimum cost and upkeep.

WEIRKOTE® IN PARTICULAR—You gain when you specify long-life galvanized steel for your guard rails. And you gain even more when you specify National Steel's Weirkote. To the inherent strength of steel, Weirkote adds *enduring* zinc protection. Weirkote is manufactured by two National Steel divisions, Weirton Steel and Midwest Steel. For complete details, write Weirton Steel Company, Weirton, West Virginia.

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Portage, Indiana

WEIRTON STEEL
Weirton, West Virginia

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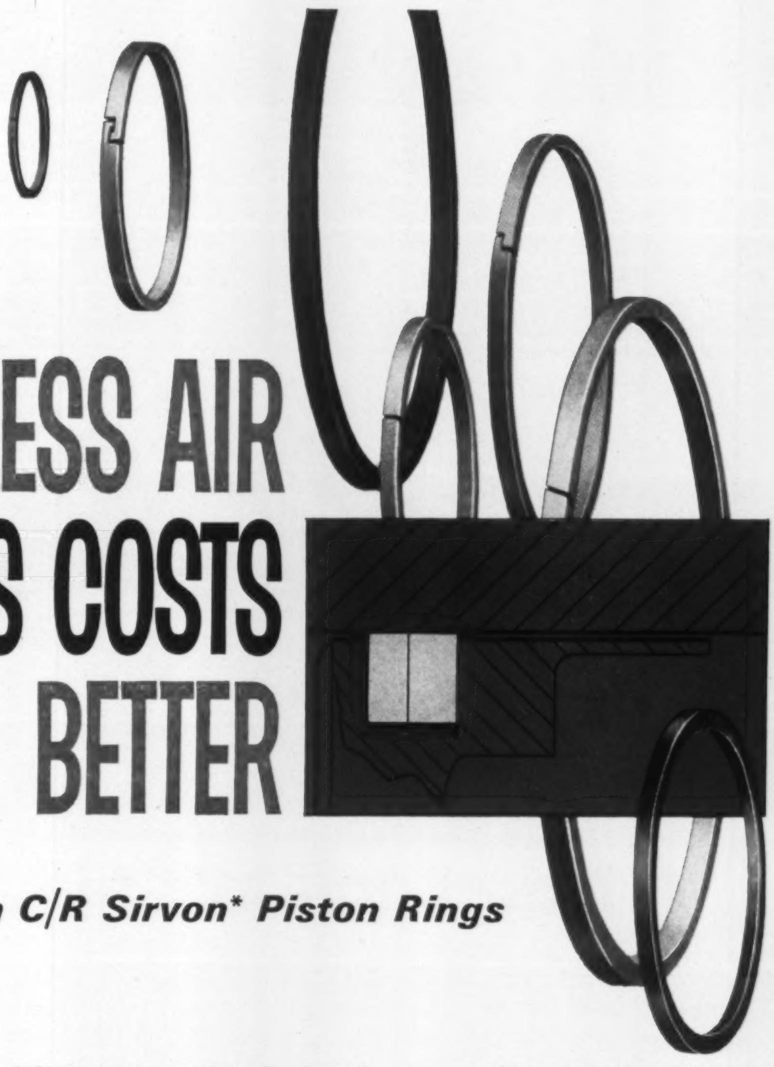

COMPRESS AIR
COMPRESS COSTS
BETTER

when you design-in C/R Sirvon Piston Rings*

Here's how well they're working now—for others:

Case 1—In air: Two split Sirvon rings in one groove were used in a small portable compressor under these conditions: speed 1725 rpm, stroke .352", pressure 75 p.s.i., output air temperature 100°F. No lubricant. After discontinuance of testing at 2000 hours, the rings were still in excellent condition, functioning perfectly. Other applications require only a single ring.

Case 2—In oil: A leading farm equipment manufacturer has tested and approved C/R Sirvon solid rings for a hydraulic application at pressures up to 2000 p.s.i., and shock pressures to 2500 p.s.i. in fluid equivalent to S.A.E. #10 oil. (Rings have been applied in special cases under pressures up to 8000 p.s.i.)

Consider these advantages

Right now Sirvon rings are permitting important cumulative economies in pneumatic and hydraulic units for both manufacturer and user.

1. Sirvon rings can run bone-dry where oil might contaminate the system.
2. Friction loss is greatly reduced by the low coefficient of the base resins.
3. Low-friction Sirvon rings greatly increase service life — eliminate cylinder scoring.
4. Piston design is simpler, less costly.
5. Ring installation is simple, assembly costs less.
6. Leakage is reduced.

Further, Sirvon rings are practicable for use in almost any air, gas, or fluid medium. They are inert to all commercial chemicals except hydrofluoric acid and molten alkalies, and will operate at temperatures from −400 to +500°F.

Why C/R Sirvon Piston Rings?

Because Chicago Rawhide is already an acknowledged leader in the field. C/R has experience in the complex technology required for compounding, molding or extruding piston rings with correct thermal stability, wear resistance and dimensional accuracy. In short, C/R knows how—now—and is producing dependable rings in large quantities for major users. C/R Sirvon engineers will welcome the opportunity to work with you.

Free sample: Tell us the size ring you would like to see. We'll send you a free sample Sirvon ring in that range. No obligation, of course.

*"SIRVON" C/R's trade name for fluorocarbon resin based compounds. In this case the base was "Teflon" (Du Pont Registered T. M.)

C/R

CHICAGO RAWHIDE
MANUFACTURING COMPANY

1219 Elston Avenue • Chicago 22, Illinois
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See your telephone directory
In Canada: Chicago Rawhide Products Canada Ltd., Brantford, Ontario
Export Sales: Geon International Corp., Great Neck, New York

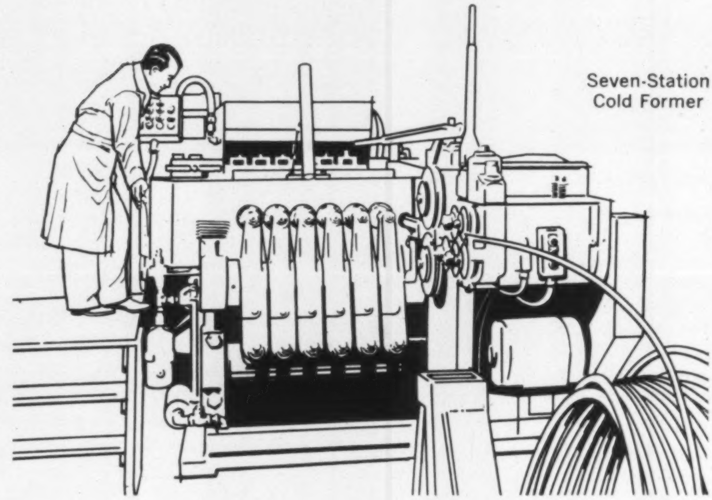
A New Look at Cold Forming!

The new National Seven-Station Cold Former now lets you make parts you had "shelved" as impractical. Six- and seven-station Cold Formers are routinely producing the formerly "impossible" jobs. Many are formed scrapless, most are practically finished, all are cold-formed automatically from coiled wire.

Production rates for these parts range from 45 to 115 *per minute!*

If you make odd-shaped parts, may we help you evaluate them for the potential that awaits you with these new Cold Formers? Come to Tiffin, witness our demonstrations and let's discuss your work.

No obligation.



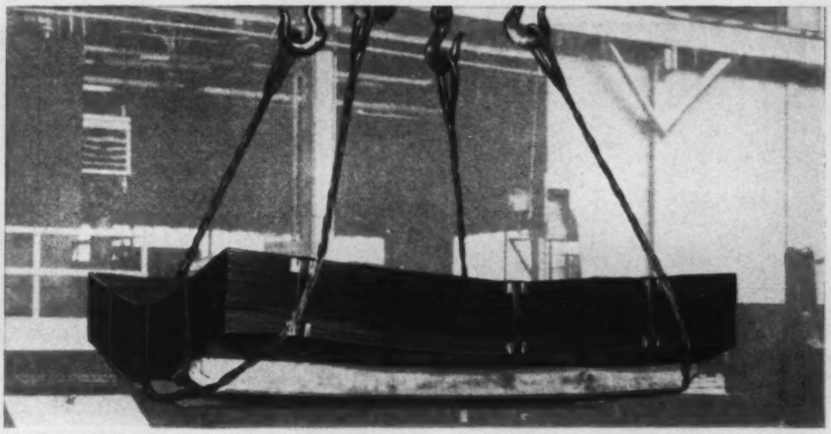
Seven-Station
Cold Former

FORGING MACHINES • MAXIPRESSES • REDUCEROLLS
BOLTMAKERS • NUT FORMERS • TAPPERS
COLD HEADERS • PARTS-MAKING MACHINES

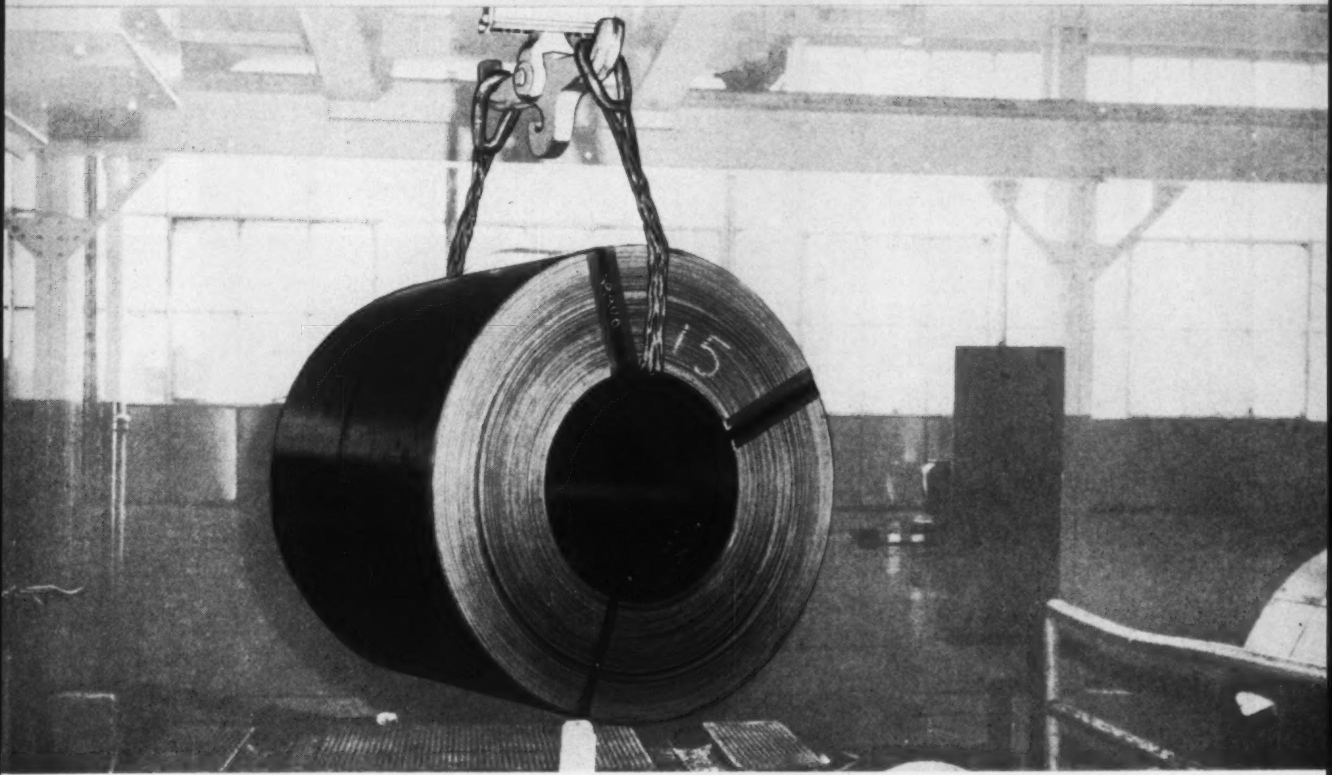
NATIONAL MACHINERY CO.

TIFFIN, OHIO, U. S. A.

HARTFORD **DETROIT** **CHICAGO**



Two M-1-BB Yellow Strand Braided Safety Slings, each 8 parts of $1/4$" wire rope, easily handle this 12,800 lb. load of sheet steel. Sharp edges make this an extra tough sling assignment.



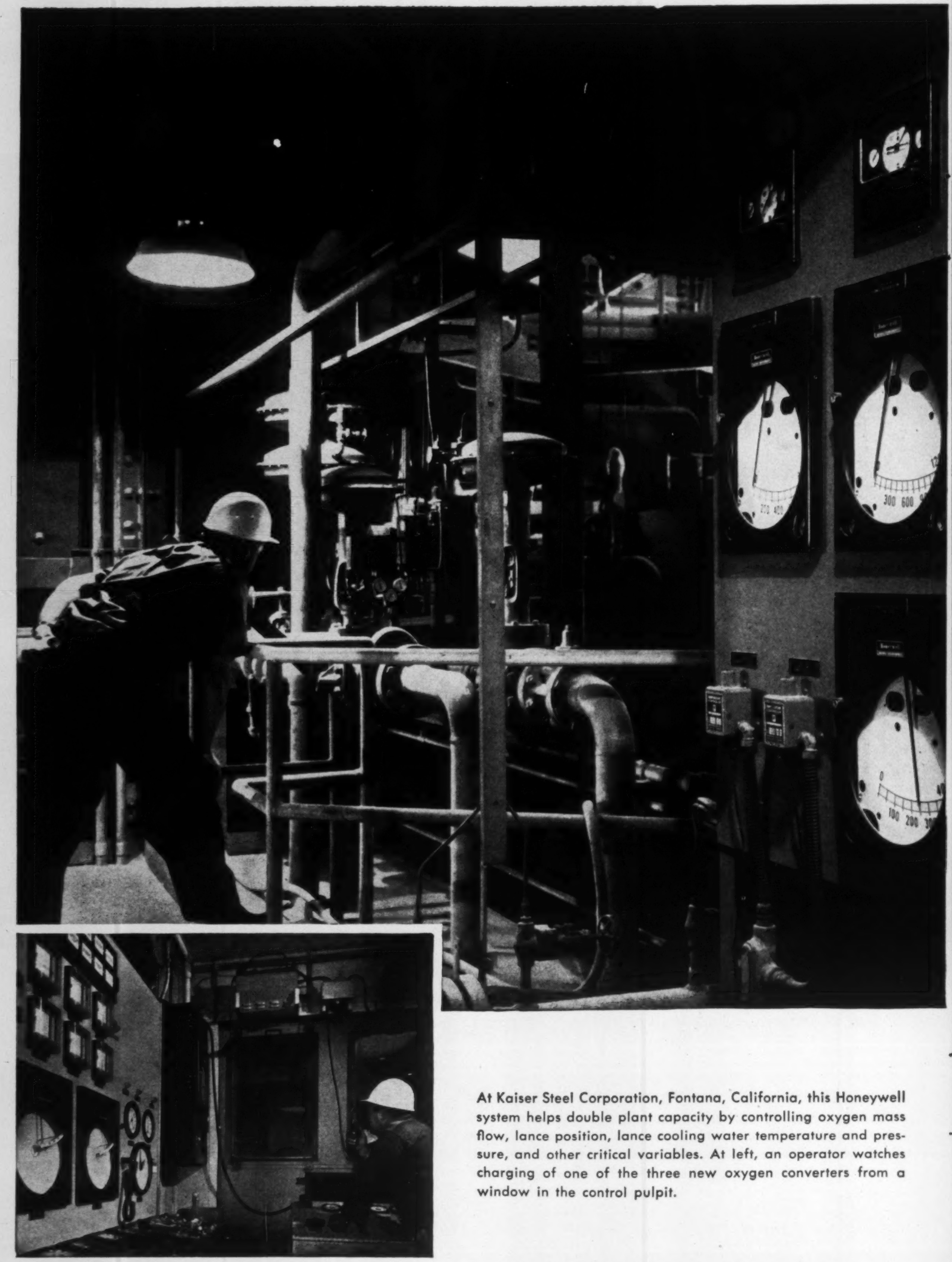
Fourteen parts of $1/4$" Yellow Strand make up this special Flat Braided Safety Sling carrying a 19,900 lb. coil of steel. The right blend of strength and flexibility is of paramount importance here.

The tougher the load, the better the reason for using Yellow Strand Braided Safety Slings

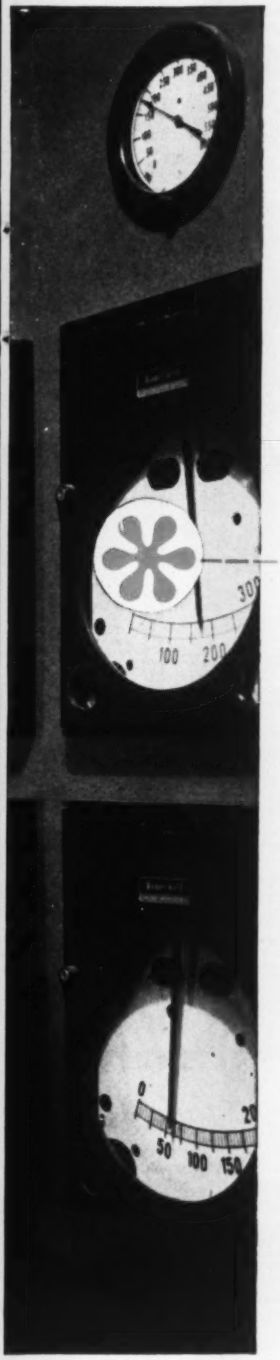
Why Yellow Strand slings? First you get the expert help and advice of experienced Yellow Strand sling experts in selecting the best sling for your specific task. Then your sling is constructed of rugged Yellow Strand wire rope. What's more, your sling is custom-built by experienced Yellow Strand sling craftsmen. The result is a strong, durable sling built specifically for your job. Call on your Yellow Strand sling expert anytime.

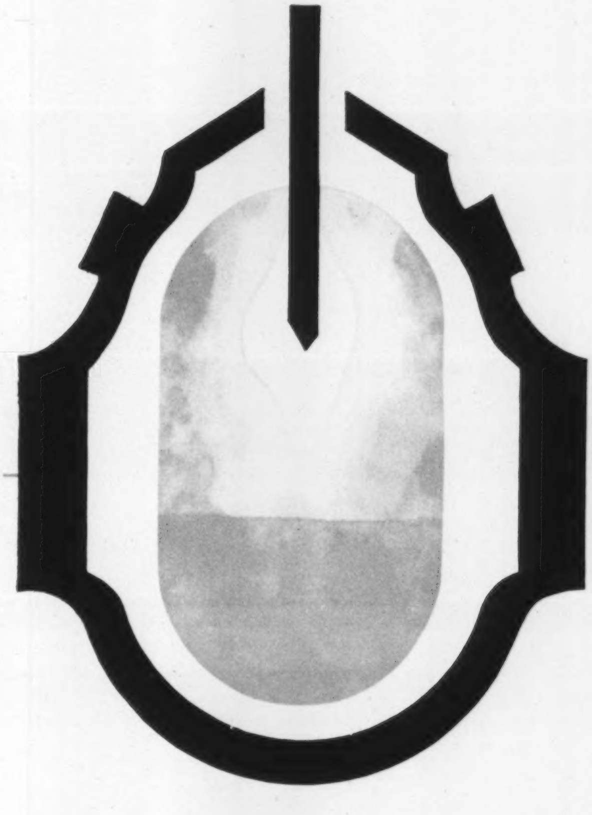
Yellow Strand®
BRAIDED SAFETY SLINGS

BRODERICK & BASCOM ROPE CO.
ST. LOUIS · PEORIA · HOUSTON · SEATTLE



At Kaiser Steel Corporation, Fontana, California, this Honeywell system helps double plant capacity by controlling oxygen mass flow, lance position, lance cooling water temperature and pressure, and other critical variables. At left, an operator watches charging of one of the three new oxygen converters from a window in the control pulpit.





Why did Kaiser select Honeywell instrumentation for its L-D process?

At the Fontana plant of Kaiser Steel Corporation, Honeywell instruments were selected for the new basic oxygen steelmaking shop. This new process required instruments that were accurate, reliable, and fast enough to deliver the precise integrated control needed.

Kaiser Engineers called on Honeywell to furnish the necessary control instruments.

If you're planning to use the oxygen process—in converter or open hearth—you'll find it profitable to have Honeywell design your entire control system, complete from primary elements to computer, and tailored to the particular requirements of your mill. Your nearby Honeywell field engineer can give you complete details. Call him today—he's as near as your phone.

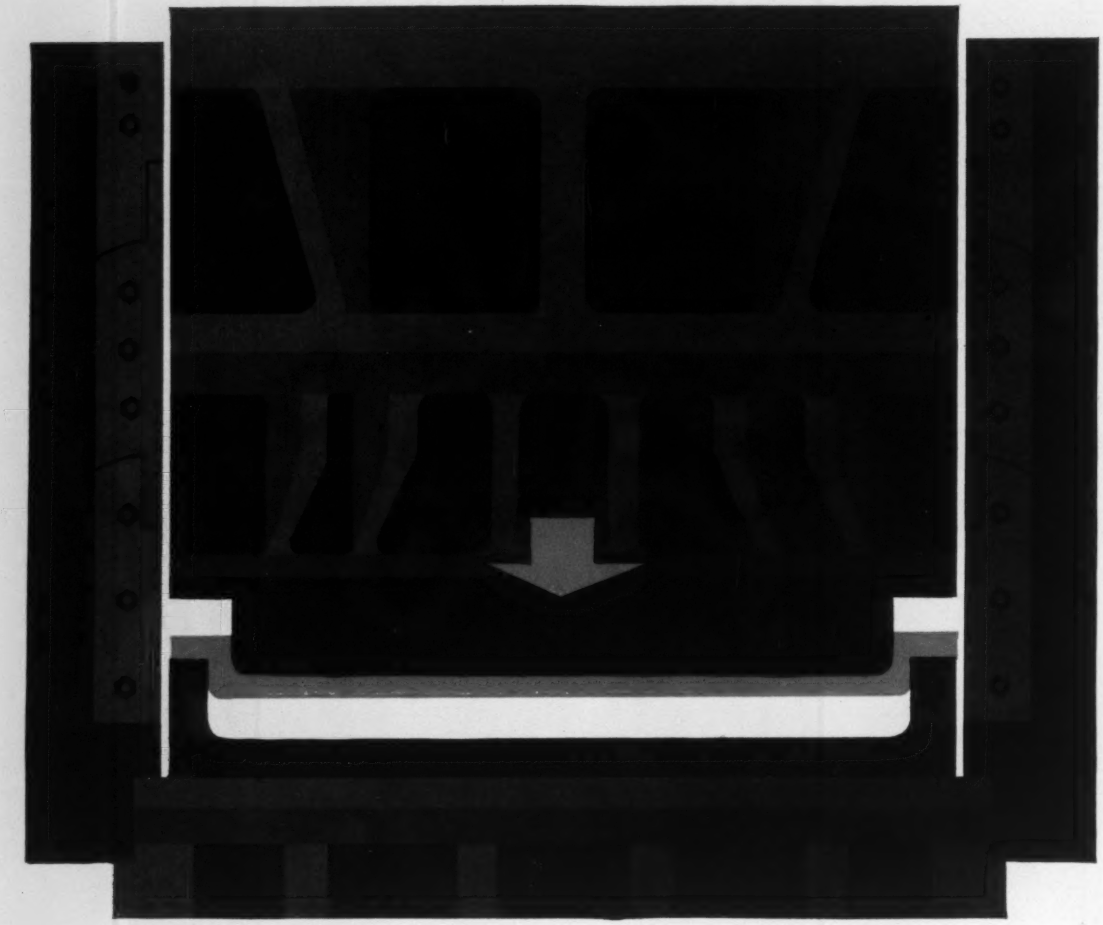
MINNEAPOLIS-HONEYWELL, Wayne and Windrim Avenues, Philadelphia 44, Pa. In Canada, Honeywell Controls, Ltd., Toronto 17, Ontario.

Honeywell

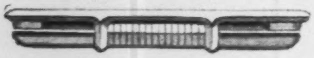
First in Control

SINCE 1885

HONEYWELL INTERNATIONAL Sales and Service offices in all principal cities of the world. Manufacturing in United States, United Kingdom, Canada, Netherlands, Germany, France, Japan.



Cut drawing costs with the Pennsalt System Approach



For new economies in metal processing, see what the Pennsalt System Approach can do in your plant. Because we make both chemicals and equipment, we can engineer them to work together for peak production, highest product quality, lower chemical and labor costs on your line. Take cold-forming and deep-drawing, for example:

The materials. Alkaline cleaners for preparing stock before applying lubricant; Foscoat® and Fosbond® pre-lubricant coatings. Dry-at-the-press Foslube® cold-forming lubricants; Drawcote® deep-drawing lubricants. Cleaners for removing lubricants before subsequent finishing or annealing. Strippable vinyl coatings for protecting finished parts.

The machines. Multi-stage Drawcote automatic machines for spray or roller coating; automatic tank and spray washers; drying ovens; immersion tanks for dip coating—custom-engineered to your production requirements.

Other "work-together" combinations from Pennsalt include over 40 types of cleaners for all metals, and the tank and power spray washers; pickling compounds, and automatic pickling machines; Fosbond phosphating products, and automatic phosphating machines.

Personalized service. Trained specialists from our nationwide field organization analyze your process requirements, help with installation and start-up, then follow up with regular service calls to keep your finishing line running at peak efficiency. Call or write for a consultation, and for our free booklet, "The Pennsalt Metal Preparation Service Plan."

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Pennsalt Chemicals
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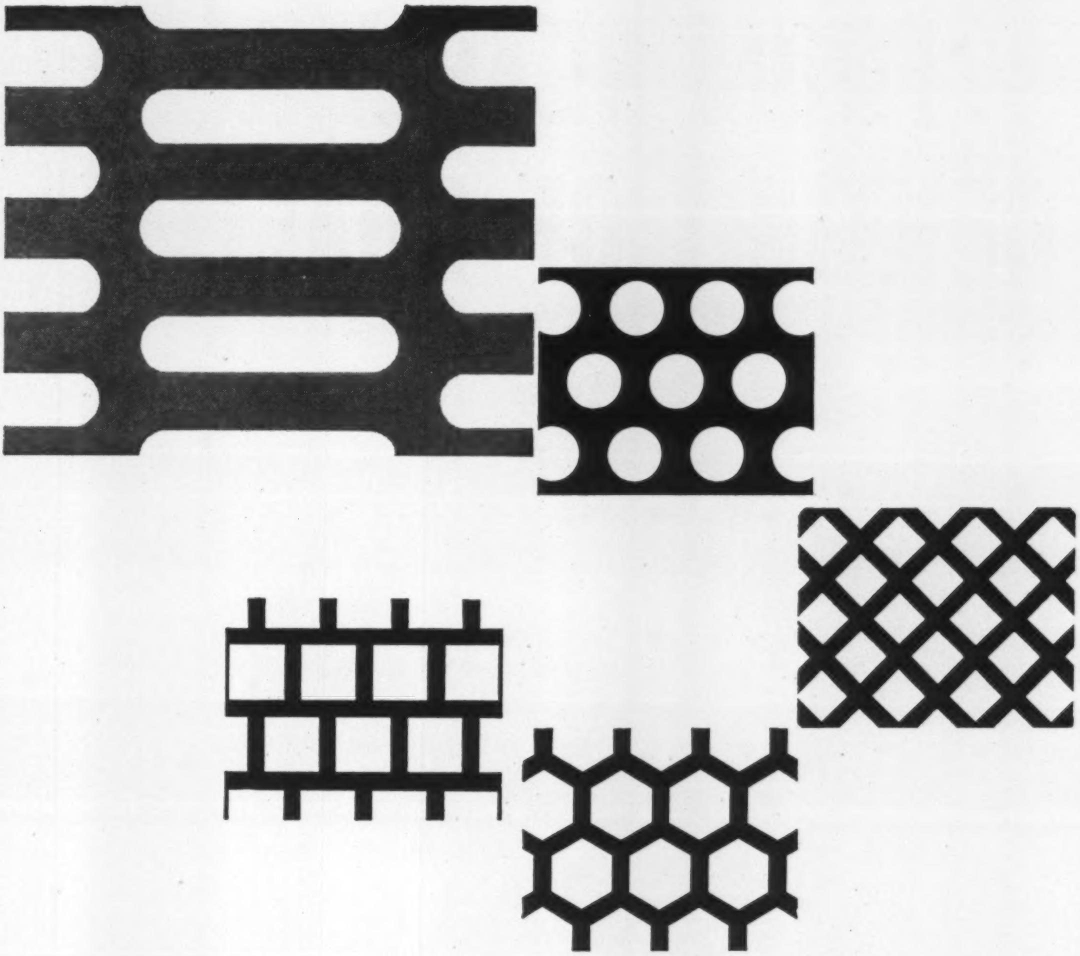

put an extra plus in new products... HENDRICK perforated metal

Metalworking fabricators well know the importance of adding to product appearance **while the product is in the design stage.** That's why so many design engineers come to Hendrick for advice. Hendrick's vast stock of dies and perforating experience are invaluable aids to manufacturers planning new design application and product development.

Hendrick perforated metals are available in a wide variety of patterns in every commercially rolled metal. Hendrick also perforates masonite, rubber, plastic and insulated board. Each can be supplied in a large number of sizes in plain or panel effects. Hendrick perforated metal is available in round, hexagon, square, slot and diamond openings. Mail the coupon for more information.

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Produced by the same traditional devotion to quality that marks other Nicholson products, these hole saws are a planned addition to Nicholson hacksaws and band saws. Try them: Your Nicholson Saw Distributor* should have a well-balanced inventory on hand.

* Industrial Distributors provide the finest goods and services in the least possible time. Our products are sold exclusively through them.

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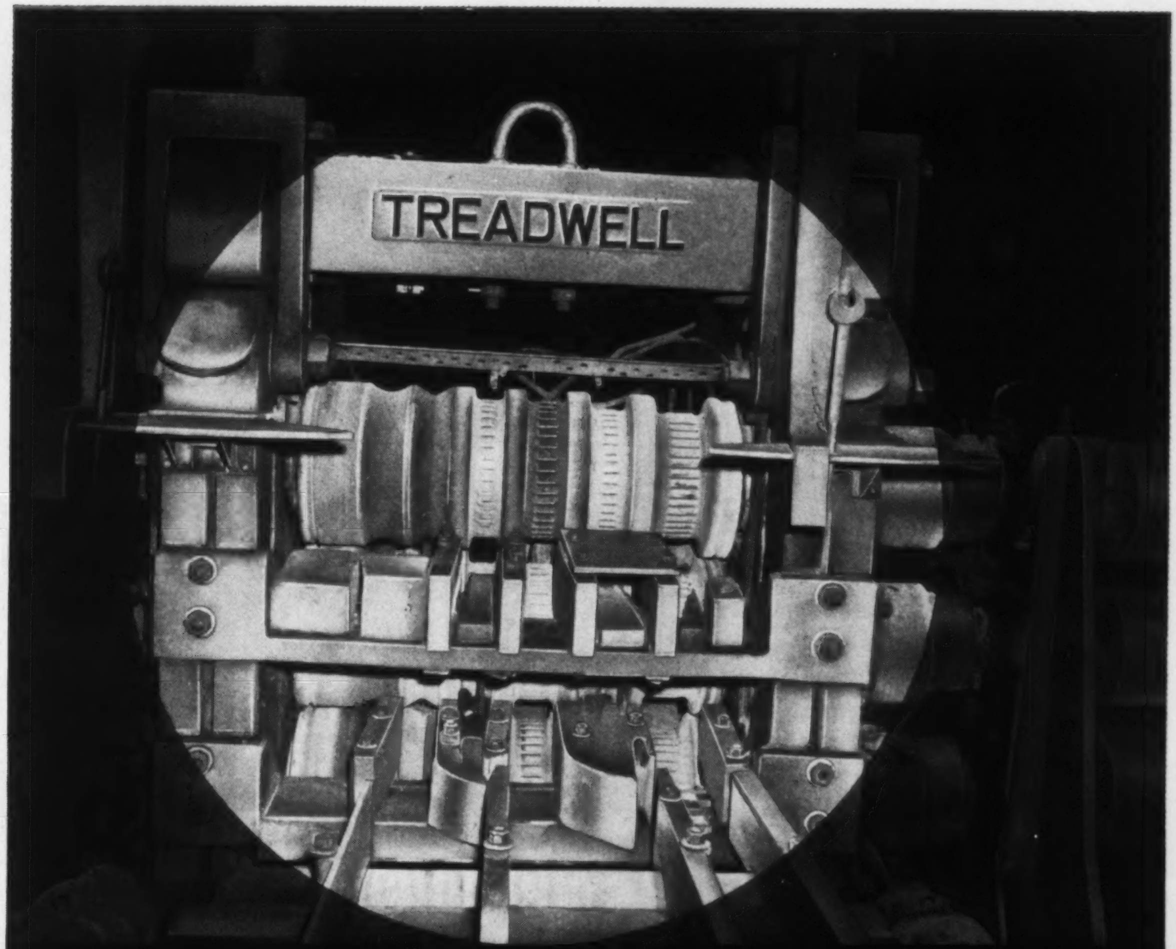

COORDINATED TREADWELL ENGINEERING

SAVES TIME, MONEY AND MAINTENANCE

Furnace side view of 21-inch 3-high merchant mill stand. Entry and delivery guides designed by TREADWELL. Cast of ductile iron in the TREADWELL foundry. Tilting tables supplied by TREADWELL, too. Designed, built and delivered on schedule by TREADWELL. We will do the same for you. See our equipment specialties listed below.

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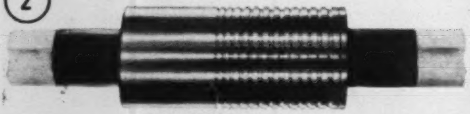
①

②



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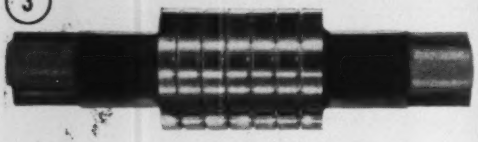

Hardened rod and bar mill rolls ground five to ten times faster

Spectacular time and cost savings result from Sheffield's Crushtrue® method of grinding mill rolls on the latest Model 180 and 181 Multi-Form grinders. For example, the large bar edging roll (1) was ground in six hours, as against 45 hours by conventional turning—a saving of 86%. The small edging roll (2) was ground in 80 minutes, a 98% reduction from the 72 hours previously required! The roll for sled runners (3) has narrow T-section grooves, was ground in 1¾ hours as against a 50-hour turning job.

Sheffield is currently building Model 190 grinders for rolls as large as 6′ x 14″ and as heavy as 3000 pounds.

Write for full details about Sheffield roll grinders, Crushtrue® grinding, and Sheffield's contract grinding services.

The
SHEFFIELD
Corporation *Dayton 1, Ohio*

A subsidiary of The Bendix Corporation

Inspection Gages, Dimensional Control Instruments, Machine Controls, Automatic Gaging & Assembly Systems, Measuray® X-Ray Thickness Measuring, Crushtrue® & Multiform® Grinders, Cavitron® Ultrasonic Machine Tools, Press-Pacer® Transfer Units, Large Dies, Tooling, Contract Manufacturing.

SANDVIK 11R51 STAINLESS STEEL

A Proven Solution To These Spring Problems

Sandvik 11R51 steels' combination of high corrosion resistance and superior spring characteristics has proven itself in spring designs which must . . . .

1 Withstand severe temperature changes and condensates

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4 Not creep during long period of stress

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☐ Please send me your free booklet on Sandvik 11R51.
☐ Please have your representative phone for an appointment.

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Company____________________________

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Works: Sandviken, Sweden.

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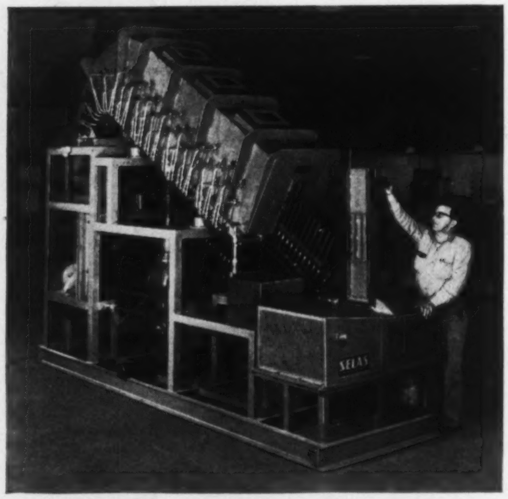
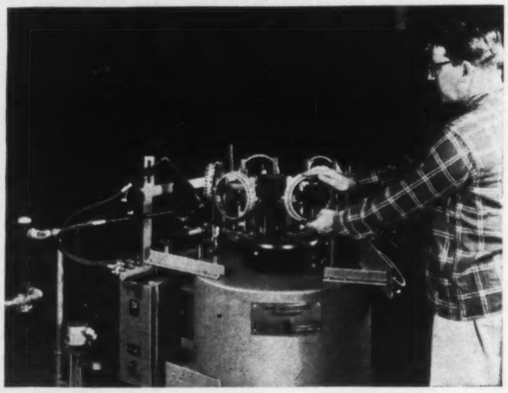
NEW SLANTS ON HEAT PROCESSING FROM SELAS

here's how industry cuts costs . . . Selas Heat Processing

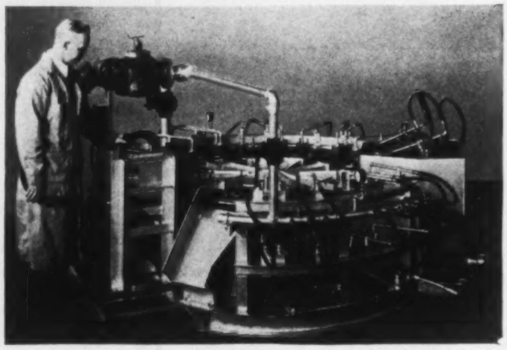
FORGING *Continuous unit fits compactly into production line to heat alloy steel bars for forging into C-shaped rail anchors. Production is synchronized with the forging bulldozer, up to 620 bars per hr. Inventory of work-in-process is ⅓ to ¼ of previous equipment . . occupies 20% less floor space . . reduces scale 95%. Precise heating assures consistently uniform grain structure and hardness.*



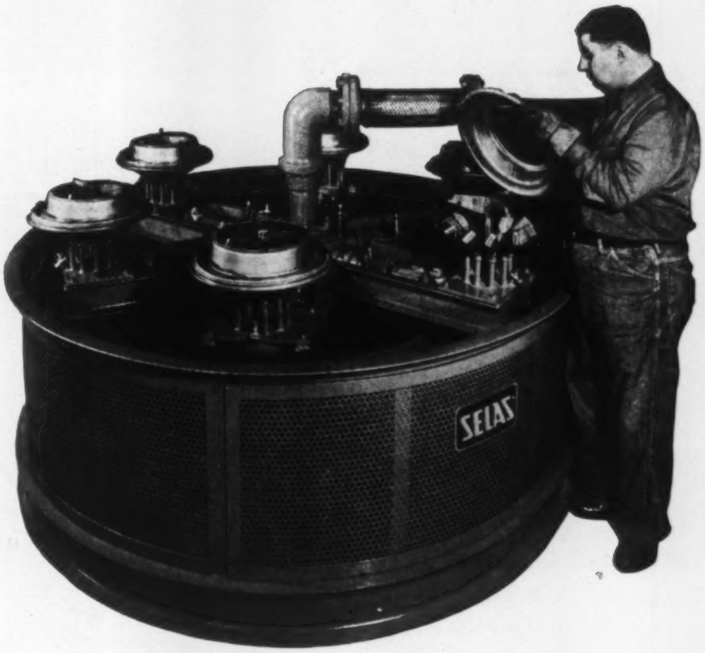
BRAZING *Compact machine automatically silver brazes Carboloy cutter to stainless steel shredder ring used in garbage disposal units. Precise fixturing, localized high-speed heating and automatic unloading permits one operator to produce up to 200 pieces per hr. . . Completely shop-assembled at Selas, unit was installed in customer's plant, ready for production operations, within hours.*



SELECTIVE HARDENING *End portions of brake shoe webs are hardened to create a more durable product. An indexing conveyor brings the two ends of webs under Duradiant burners. Designed for automatic loading, the machine heats, quenches, tempers and mechanically unloads the selectively-hardened work pieces. Service life of webs has been extended, costs have been reduced.*



improves product quality with Equipment



ANNEALING *Six-station dial conveyor automatic machine anneals a narrow band on stainless steel auto hub caps. Workpieces rotate above burners, bringing 2-in. wide band to 1800°F. in 30 sec. Production is 600/hr. Only 6 ft. 6 in. in diam., unit is located directly in the press shop production line.*

These installations are typical of how Selas *automated* heat processing equipment

- Cuts operating costs
- Increases production rates
- Minimizes in-process inventory
- Reduces labor requirements
- Saves valuable floor space
- Improves product quality

Specifically designed and custom-built to meet your individual production requirements and job specifications, Selas automated heat processing equipment employs time-proven standardized engineering features for longtime operating dependability and minimum initial investment. A Selas field engineer would welcome the opportunity to survey your requirements . . . at your convenience. No obligation, of course. For this free personal service, or for literature on any of the heating operations shown here, write to Mr. W. B. Troupe, General Industry Division.

SELAS CORPORATION OF AMERICA
110 Dreshertown Road, Dresher, Pa.

EUROPEAN SUBSIDIARY: Selas Corporation of America, European Div., S.A. Pregny, Geneva, Switzerland.
INTERNATIONAL AFFILIATES—Australia, Benelux, Canada, England, France, Germany, Italy, Japan, Portugal, Spain.

DURADIANT is a registered trademark of Selas Corporation of America.

SELAS

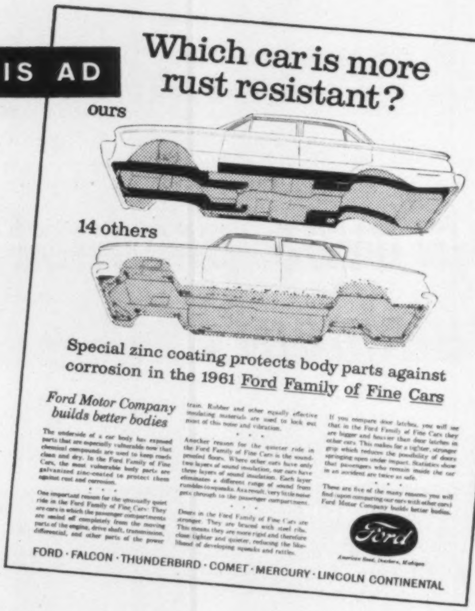
HEAT AND FLUID PROCESSING ENGINEERS

DEVELOPMENT
•
DESIGN
•
CONSTRUCTION

THE RESEARCH STORY BEHIND THIS AD

ZINC

—Chosen By Process Of Elimination



ours
14 others

Which car is more rust resistant?

Special zinc coating protects body parts against corrosion in the 1961 Ford Family of Fine Cars

Ford Motor Company builds better bodies

The underside of a car body has exposed parts that are especially vulnerable now that chemical compounds are used to keep roads clean and dry. In the Ford Family of Fine Cars, the most vulnerable body parts are galvanized zinc-coated to protect them against rust and corrosion.

* * *

One important reason for the unusually quiet ride in the Ford Family of Fine Cars: They are cars in which the passenger compartments are sealed off completely from the moving parts of the engine, drive shaft, transmission, differential, and other parts of the power train. Rubber and other equally effective insulating materials are used to lock out most of this noise and vibration.

* * *

Another reason for the quieter ride in the Ford Family of Fine Cars is the sound-proofed floors. Where other cars have only two layers of sound insulation, our cars have three layers of sound insulation. Each layer eliminates a different range of sound from rumbles to squeaks. As a result, very little noise gets through to the passenger compartment.

* * *

Doors in the Ford Family of Fine Cars are stronger. They are braced with steel ribs. This means they are more rigid and therefore close tighter and quieter, reducing the likelihood of developing squeaks and rattles.

If you compare door latches, you will see that in the Ford Family of Fine Cars they are bigger and heavier than door latches in other cars. This makes for a tighter, stronger grip which reduces the possibility of doors springing open under impact. Statistics show that passengers who remain inside the car in an accident are twice as safe.

* * *

These are five of the many reasons you will find (upon comparing our cars with other cars) Ford Motor Company builds better bodies.

Ford

American Road, Dearborn, Michigan

FORD · FALCON · THUNDERBIRD · COMET · MERCURY · LINCOLN CONTINENTAL

FORD TESTED

A — ORGANIC COATINGS
1. Primers (Solvent Base and Water Emulsion Base)
2. Metallic Rich Paints
3. Plastic Coatings
4. Self Foaming Materials
5. Greases, Waxes, etc.

B — STEEL ALLOYS
1. Stainless Steel
2. Special Alloys

C — MORE UNUSUAL METHODS
(Such as vapor phase inhibitors, irradiated steels, forced ventilation, etc.)

D — METALLIC COATINGS
1. Aluminum Clad
2. Terne Plate
3. Tin Plate
4. Cadmium Plate
5. Zinc Coated
    A. Electrogalvanized
    B. Hot Dipped

The search for the best defense against corrosion was a major project with Ford Motor Company. A long and painstaking series of laboratory, road and production tests were scientifically conducted and evaluated before Ford named the winner—*galvanized steel.*

FORD EVALUATED THEM FOR

1. Corrosion Protection
2. Formability
3. Weldability
4. Painting
5. Method Employed (special requirements in applying, inspection, etc.)
6. Stock (and scrap) handling problems, if any
7. Cost

Reprints of an extensive report on the Ford research program which culminated in their choice of Zinc are available on request from St. Joe.

Corrosion-Protection Is A Job For ZINC

—AND THE ZINC FOR THE JOB

ST. JOSEPH LEAD COMPANY **ST. JOE**

250 PARK AVENUE **NEW YORK 17, N.Y.**

ZN-192

TURNKEY

The design and construction approach that can cut time and costs on your new plant—and KE is a master at it!

Turnkey means that one, universally-competent architect-engineer-construction firm takes your new plant or expansion project, from initial concept to start-up—*literally from A to Z!* Project phases typically include feasibility studies and site selection, plant concept and preliminary engineering, detail design, procurement, construction, start-up and maintenance. You enjoy the proved efficiencies of single-contract responsibility, and free your own key people from time-consuming attention to the project. In Steel, in Minerals, in Power Generation, in the Nuclear field—Kaiser Engineers' experience in turnkey projects is widely recognized. A call from you will bring a specialist in your industry to summarize how KE has performed for others, can save money and valuable time for you.

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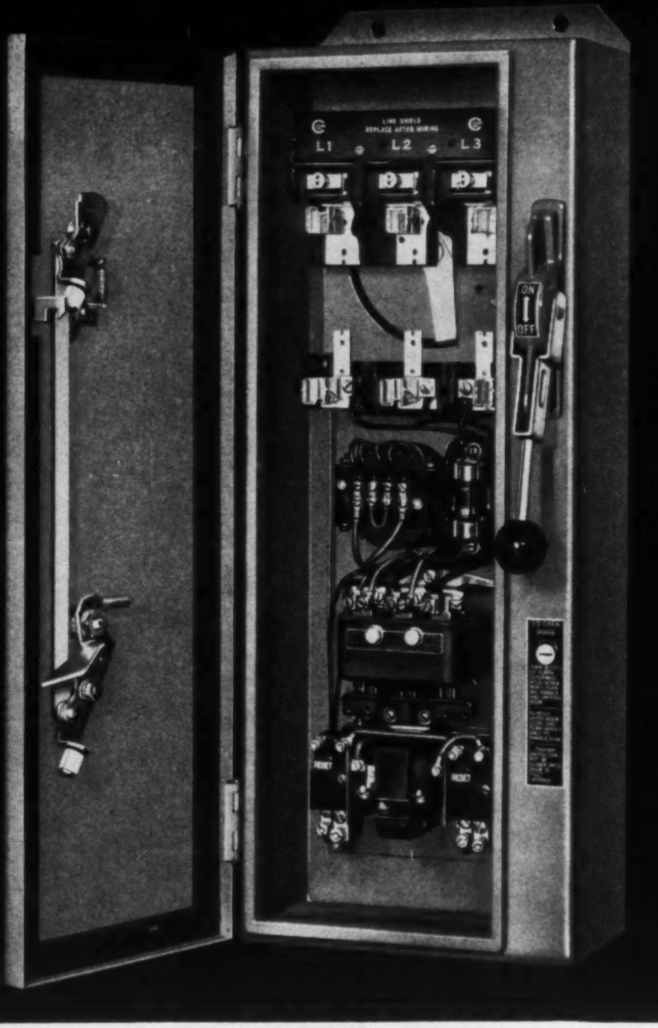
NEW

FROM CLARK

NEMA 12 SAFETY COMBINATION STARTERS WITH THREE EXCLUSIVE FEATURES



Safety fusible combination starters are gaining wide interest throughout industry. But only the new Clark line offers these important features:

- *New Clark-built visible blade disconnect switch with double-break, silver-alloy to silver-alloy contact surfaces*
- *Disconnect switch accommodates NEC or the new Class J Current Limiting fuses*
- *To simplify installation, complete unit can be removed from enclosure in seconds with no disassembly of handle mechanism*

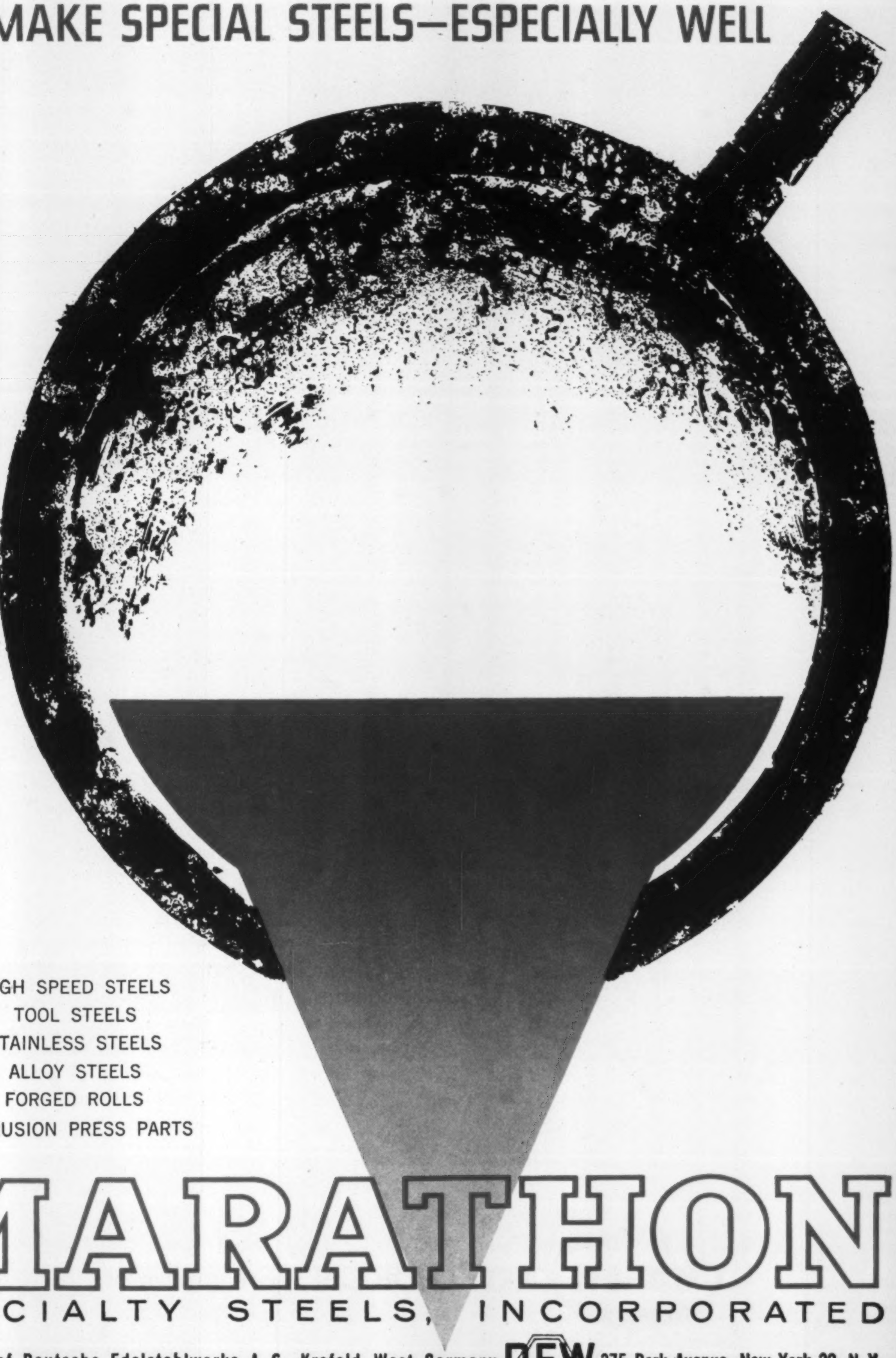
New Clark Safety Starters offer non-teaseable, snap-action disconnect switch operation. Cabinet design permits only authorized persons to open door when switch is on, or to close switch when the door is open. Dust-tight operation is assured by interlock which requires door handle to be closed and door tightly latched before disconnect switch is operable.

These Clark Safety Fusible Combination Starters are available with interchangeable fuse clips to accommodate a full range of fuses, and are offered with famous Clark "CY" Contactors in sizes 0, 1, and 2. Designed for NEMA 12 (industrial) service, they also are suitable for NEMA 5 (dust-tight) applications. For information, call the nearest Clark distributor or sales office, or write: 61SCS1

THE CLARK CONTROLLER COMPANY

MAIN PLANT: CLEVELAND, 10 • **WESTERN PLANT:** LOS ANGELES, 58
IN CANADA: CANADIAN CONTROLLERS, LIMITED, TORONTO, ONT.

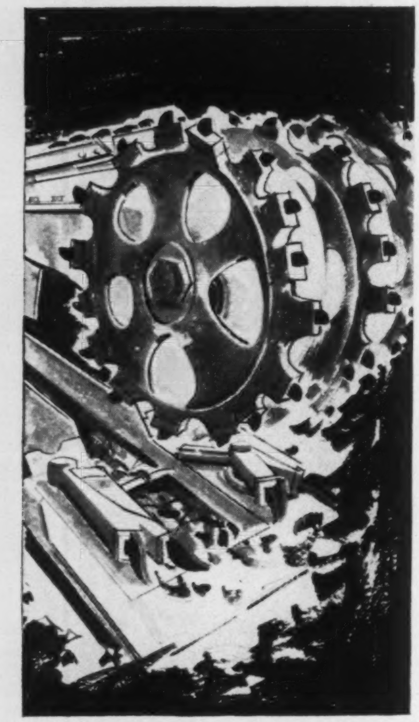
WE MAKE SPECIAL STEELS—ESPECIALLY WELL



HIGH SPEED STEELS
TOOL STEELS
STAINLESS STEELS
ALLOY STEELS
FORGED ROLLS
EXTRUSION PRESS PARTS

MARATHON
SPECIALTY STEELS, INCORPORATED

A Division of Deutsche Edelstahlwerke A. G., Krefeld, West Germany DEW 375 Park Avenue, New York 22, N. Y.



FROM MINES TO MOLARS...

V-R Carbide Mining Bits are increasing daily tonnage for miners throughout the coal industry. V-R Carbide Dental Burs are providing more pleasant dental care for people everywhere by drilling faster and cooler. In industry after industry, wherever metal requirements indicate a need for toughness, hardness, resistance to corrosion, temperature and wear, V-R Carbides are becoming first choice. Over 30-years experience in the development of carbides of the refractory metals and cast nonferrous alloys with unusual high-temperature characteristics enable Vascoloy-Ramet to meet all demands for quality and dependability. From mines to molars, whatever your metal needs may be, make V-R your first choice. Write for more information about V-R cutting tools, milling cutters, mining bits, percussion bits, investment castings and carbides of the refractory metals.
VASCOLOY-RAMET CORPORATION,
804 Market Street, Waukegan, Illinois.

V-R **FIRST CHOICE of more and more industries**

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These 4 Voss Inverted Roller Levelers are in final assembly. Soon they'll be at work in varied applications ranging from galvanized and hot and cold rolled to plate and high yield missile stock. Each of these companies, already a user of Voss Levelers, know they obtain precise area control and equal to or better than stretcher leveler flatness at high production speeds. Let Voss put 30 years of leveling and flattening experience to work for you.

Call or write today! We'll be glad to arrange a demonstration without obligation.

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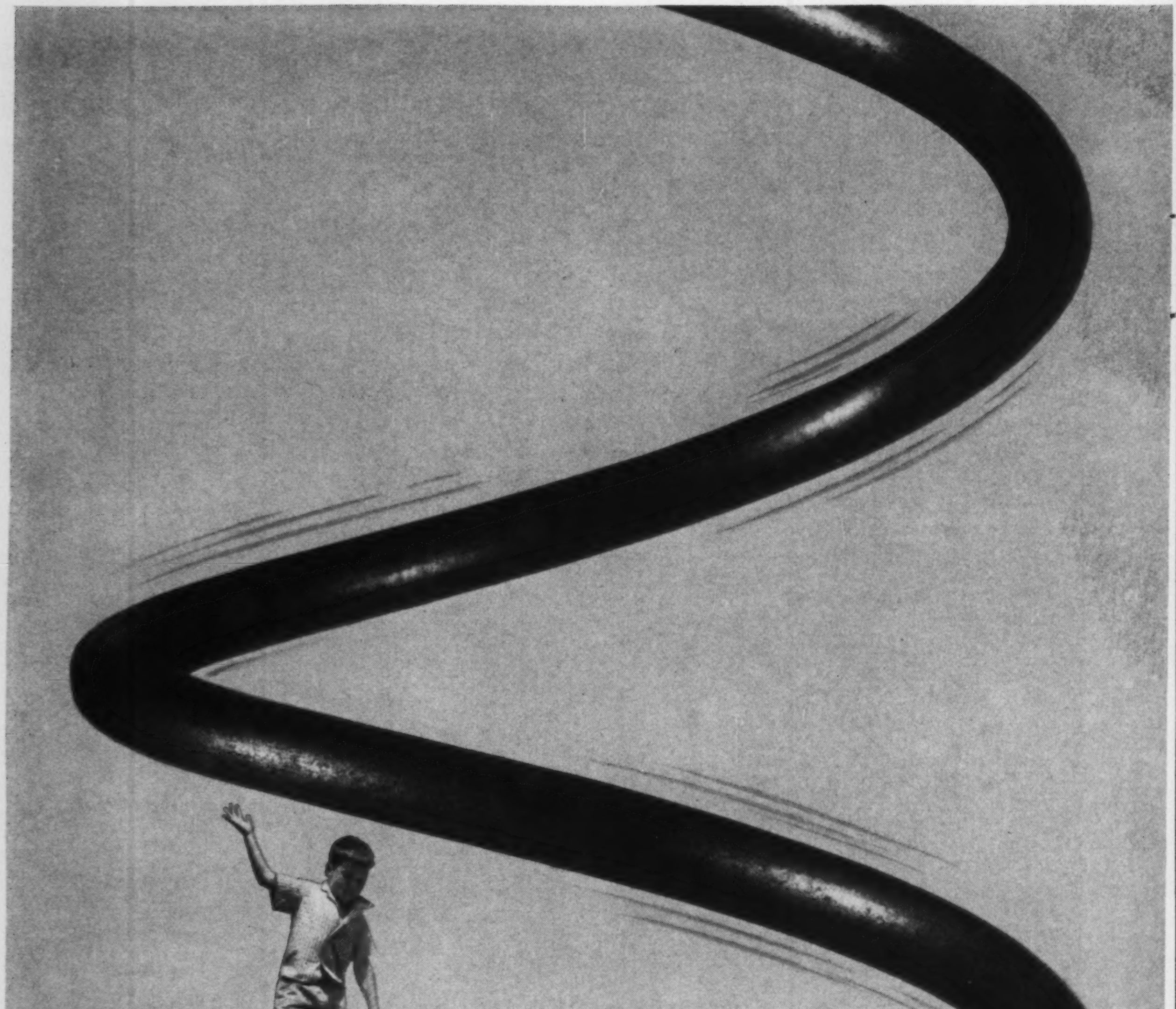


BOUNCE
BOUNCE
BOUNCE

...with CF&I Oil Tempered Wire

Trampoline springs lead a hard life. They work while others play, and no matter how much punishment they absorb, they've got to keep coming back for more. Which is one of the many reasons for forming this and other types of hard-working springs from CF&I Oil Tempered Wire. This tough, premium product has the high fatigue resistance and long life that keep spring performance *up*... the easy-working qualities that keep production costs *down*.

CF&I Oil Tempered Wire is available with Black Satin Finish that serves as a lubricant during coiling and crimping operations and prevents "flake-off." Because it virtually eliminates "stop-and-go" operations, Black Satin cuts machine downtime and production costs. This wire is available in continuous unwelded lengths weighing up to 600 lbs. Straightened and cut lengths from 6″ can also be supplied.

Oil Tempered Wire is only one of the many types produced by CF&I (a partial list is shown below). They are "packaged for your production" in special packages to increase the efficiency and economy of your operation. For complete details, contact your nearby CF&I sales office today.

8474

Steel ... your assurance of American-made quality

The Colorado Fuel and Iron Corporation
Denver • Oakland • New York
Sales Offices in Key Cities

CF&I STEEL MADE IN U.S.A.

A partial list of wires produced by CF&I: ACSR Core • bee • bookbinder • brush • chain • concrete reinforcing tie • die spring • flat, low and high carbon • glass netting • hose, reinforcement • lock spring • mattress • picture cord • screen • square, high carbon • stone • weaving

USS
Atlas
Lumnite
Atlas Lumnite

Protect downcomers from abrasion with heat-resistant concrete

A heat-resistant concrete lining, being gunited in place, solves the problem of abrasion in this blast-furnace downcomer system. Made with Lumnite calcium-aluminate cement and aggregates, this smooth, jointless concrete lining will withstand the abrasive attack of particles in the gas stream — extending the life of the steel structure.

In new installations or repairs, monolithic linings are easily and economically placed — by guniting, casting or troweling. Unit downtime is reduced because concrete reaches service strength in 24 hours.

Other applications in blast-furnace systems include foundation pads, blast main linings, stove domes and other areas where resistance to heat and corrosion are required.

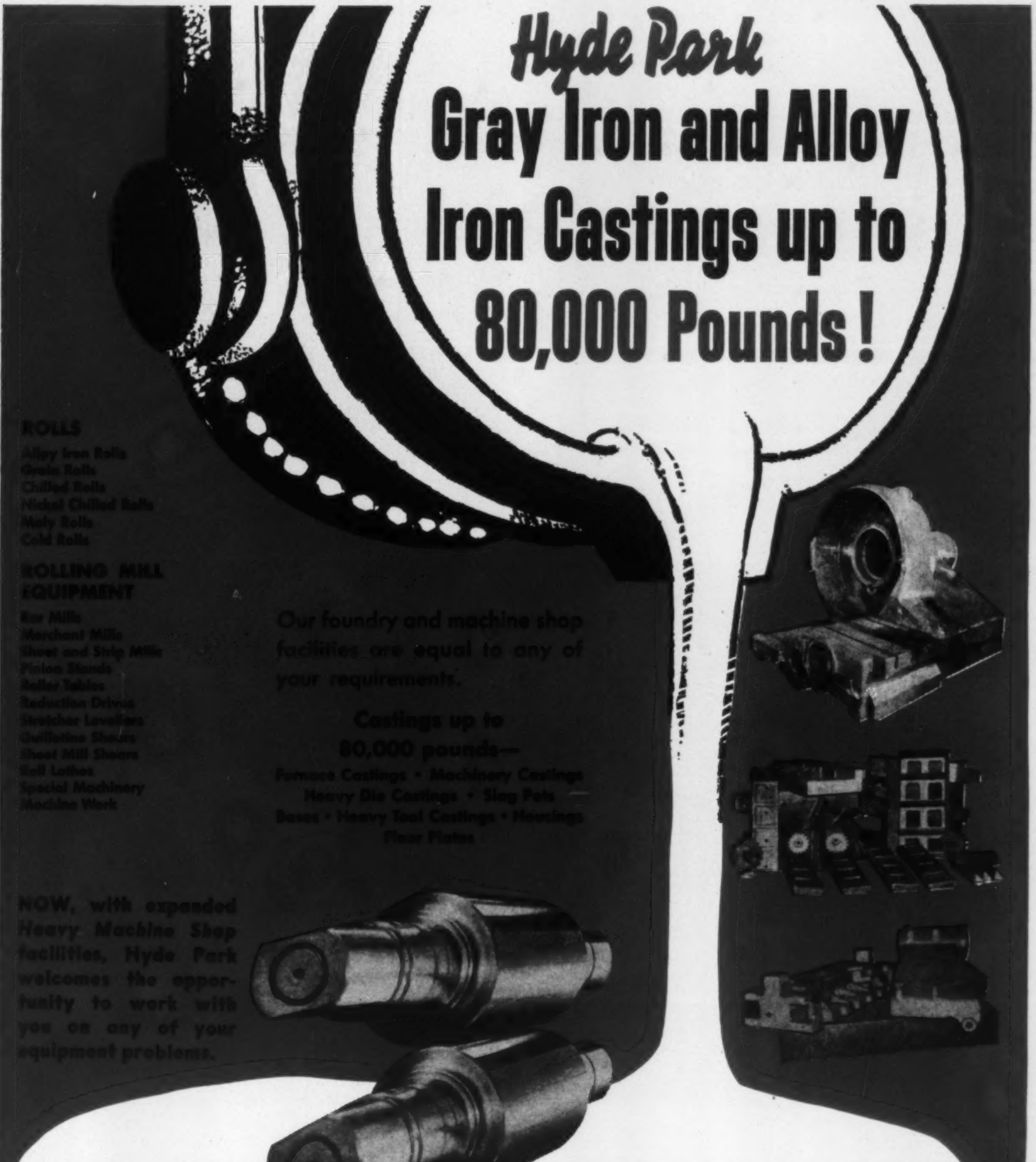
For convenience, castables bonded with Lumnite cement are available from leading manufacturers of refractories. These are packaged mixtures, ready for use by adding only water. For more information, write Universal Atlas, 100 Park Avenue, New York 17, New York.

"USS," "Atlas" and "Lumnite" are registered trademarks L-186

USS

Universal Atlas Cement
Division of
United States Steel

OFFICES: Albany · Birmingham · Boston · Chicago · Dayton · Kansas City · Milwaukee · Minneapolis · New York · Philadelphia · Pittsburgh · St. Louis · Waco



Hyde Park

Gray Iron and Alloy Iron Castings up to 80,000 Pounds!

ROLLS

Alloy Iron Rolls
Grain Rolls
Chilled Rolls
Nickel Chilled Rolls
Moly Rolls
Cold Rolls

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Bar Mills
Merchant Mills
Sheet and Strip Mills
Pinion Stands
Roller Tables
Reduction Drives
Stretcher Levellers
Guillotine Shears
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Roll Lathes
Special Machinery
Machine Work

Our foundry and machine shop facilities are equal to any of your requirements.

Castings up to 80,000 pounds—

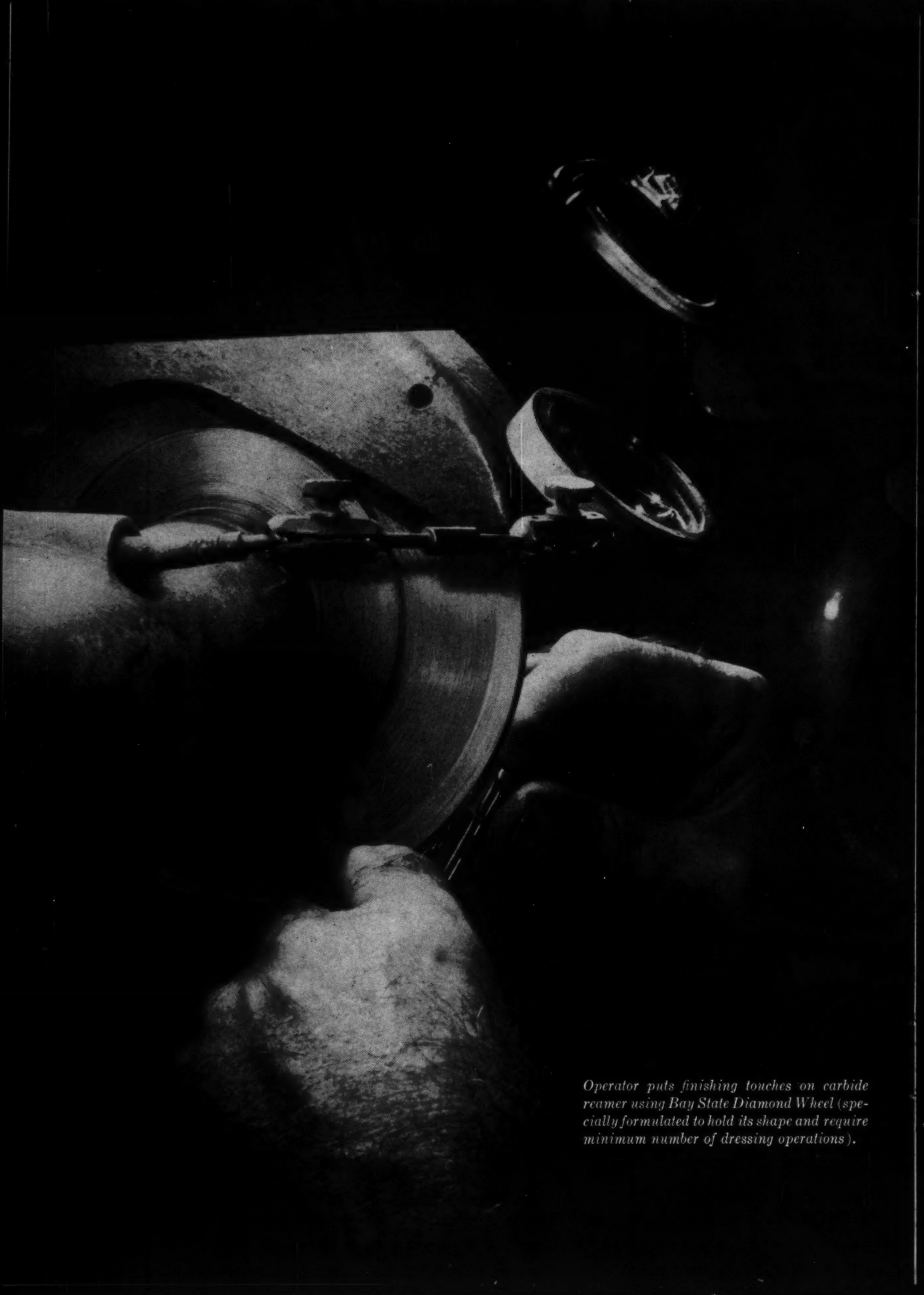
Furnace Castings • Machinery Castings
Heavy Die Castings • Slag Pots
Bases • Heavy Tool Castings • Housings
Floor Plates

NOW, with expanded *Heavy Machine Shop* facilities, Hyde Park welcomes the opportunity to work with you on any of your equipment problems.

RED CIRCLE
Rolls
ALLOY-CHILLED

Hyde Park **FOUNDRY & MACHINE CO.**

HYDE PARK, WESTMORELAND COUNTY, PITTSBURGH DISTRICT, PA.



Operator puts finishing touches on carbide reamer using Bay State Diamond Wheel (specially formulated to hold its shape and require minimum number of dressing operations).

BAY STATE TEAMWORK PAYS OFF AGAIN

with a new diamond wheel for SEVERANCE TOOL

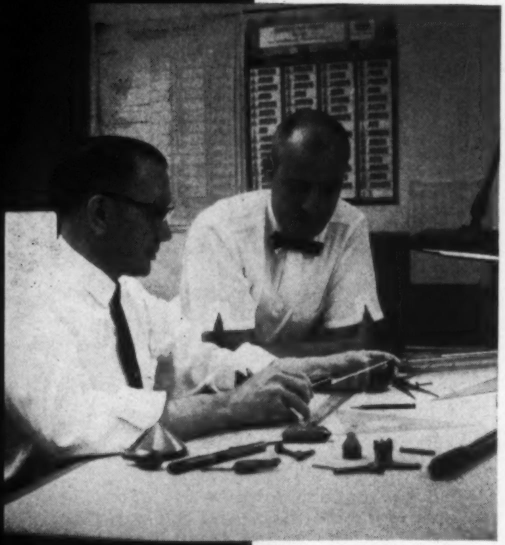
When you use a substantial number of diamond wheels every month, it pays to keep a steely eye on costs. That's why a man like Purchasing Agent Millard Wells of the Severance Tool Industries, Saginaw, Michigan, insists on continuous testing for every cost factor in the book.

The specific problem was to develop an improved diamond wheel for close-tolerance grinding of Severance Carbide Reamers and at the same time to reduce time-consuming, material-wasting dressing operations.

Figuring out the details of the new wheel was a team operation right from the beginning. Bay State's Sales Engineering Staff and the Quality Control people in Westboro worked very closely with Jack Sullivan, of distributor Saginaw Supply Corporation and with Severance's Purchasing Agent Millard Wells.

Result: A specification that increased cutting speed and wheel life with substantially reduced dressing requirements ... and a beautiful demonstration of the benefits that accrue when two companies get together that both insist on quality right down the line.

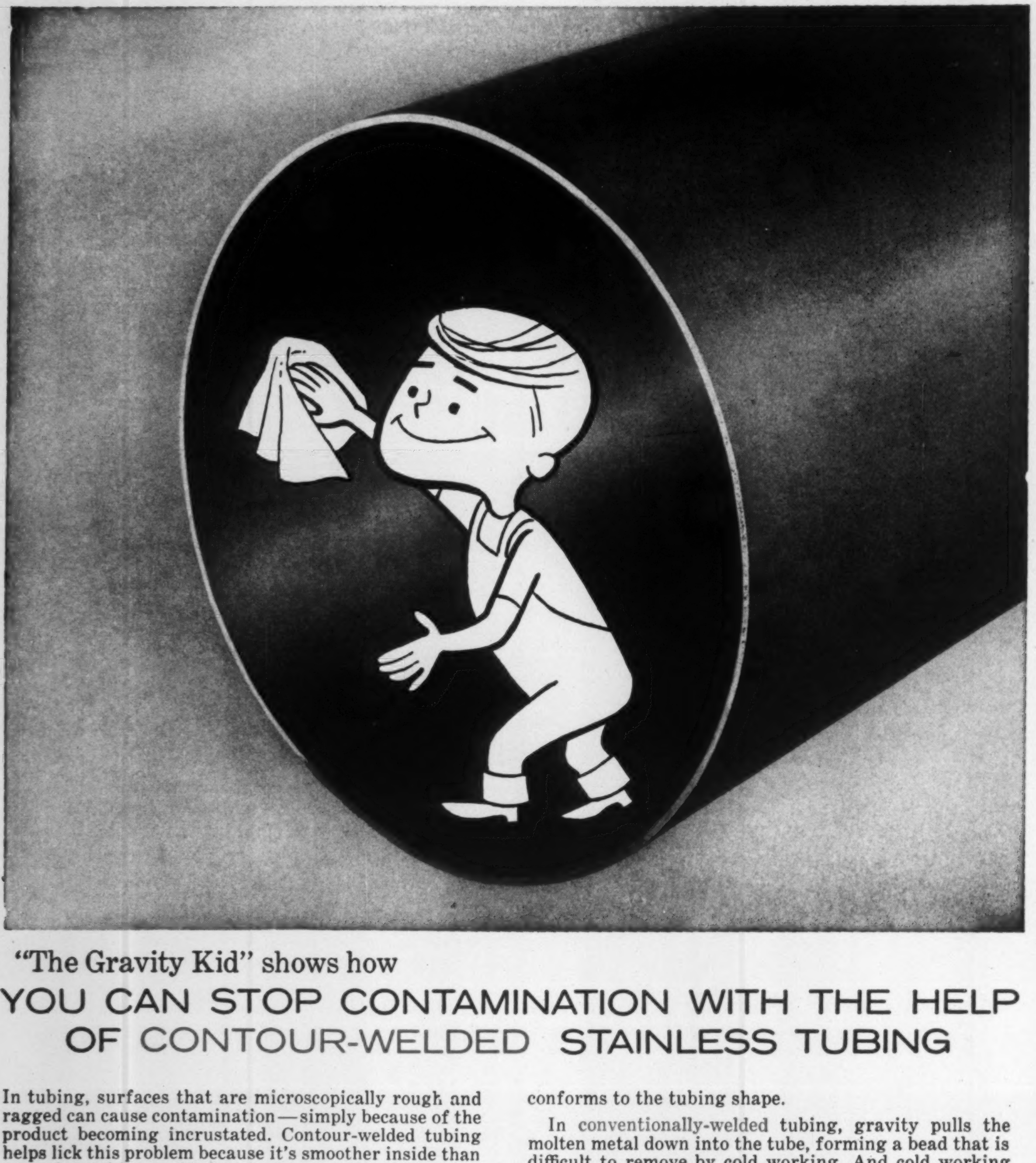
Your Bay State distributor or direct representative can show you one of the most efficient lines of diamond wheels in the world . . . as well as offer you the services of a group of specialists whose knowledge of hard-materials grinding techniques is unparalleled. *Better grinding at lower cost . . . that is our business.*



◀ *Severance Purchasing Agent Millard Wells (left) and Bay State Distributor's representative Jack Sullivan (of Saginaw Supply Corp., Saginaw, Michigan) examine typical carbide tools which require diamond grinding.*

BAY STATE ABRASIVES

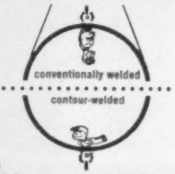
Bay State Abrasive Products Co., Westboro, Massachusetts.
In Canada: Bay State Abrasive Products Co., (Canada) Ltd., Brantford, Ontario.
Branch Offices: Chicago, Cleveland, Detroit, Los Angeles, Pittsburgh.
Distributors: All principal cities.



"The Gravity Kid" shows how

YOU CAN STOP CONTAMINATION WITH THE HELP OF CONTOUR-WELDED STAINLESS TUBING

In tubing, surfaces that are microscopically rough and ragged can cause contamination—simply because of the product becoming incrustated. Contour-welded tubing helps lick this problem because it's smoother inside than any other tubing, welded or seamless.



This smooth surface is the result of Contour-welding, a patented* process that eliminates the weld bead. Unlike conventionally-welded tubing, it's welded at the bottom. Gravity pulls the molten metal down so that the weld area corresponds to the inside contour of the tube. There's no bulge on the inside surface. Even on the outside, the seam closely conforms to the tubing shape.

In conventionally-welded tubing, gravity pulls the molten metal down into the tube, forming a bead that is difficult to remove by cold working. And cold working can lead to undercuts that become focal points for incrustation.

Even seamless tubing isn't as smooth as Contour-welded tubing. That's because it's extruded or pierced, whereas Contour-welded tubing is formed from uniformly rolled strip steel.

But see for yourself. Write today for our free 48-page manual, which describes sizes from 1/8" to 40" O.D., in stainless and high alloy steels, titanium, zirconium, zircalloy, and Hastelloy**.

TRENTWELD® Stainless and High Alloy Tubing

Trent Tube Company, a Subsidiary of Crucible Steel Company of America, General Offices and Mills: East Troy, Wisc.; Fullerton, Calif.

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* U.S. Patent 2,716,692

**Trademark Haynes Stellite Co

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WITH
ORGANIZED LUBRICATION
TEXACO
Organized Lubrication
"Stop Loss"
THE 1961 LUBRICATION YEAR
TEXACO
How to set up and operate a
LUBRICATION CONTROL SYSTEM

USE THESE IDEAS... TO GET UP TO AN EXTRA 4% NET PROFIT

Out of the Texaco man's briefcase comes a wealth of ideas for cost control through organized lubrication—Texaco's "Stop Loss" Program. Managers in many industries are already using these plans to reduce losses in three important areas: production, maintenance and purchasing. Their savings go directly into profits—the average is a 4% gain in their net. Get the facts. Write for our informative folder: "How to Starve a Scrap Pile." **TEXACO INC.,**
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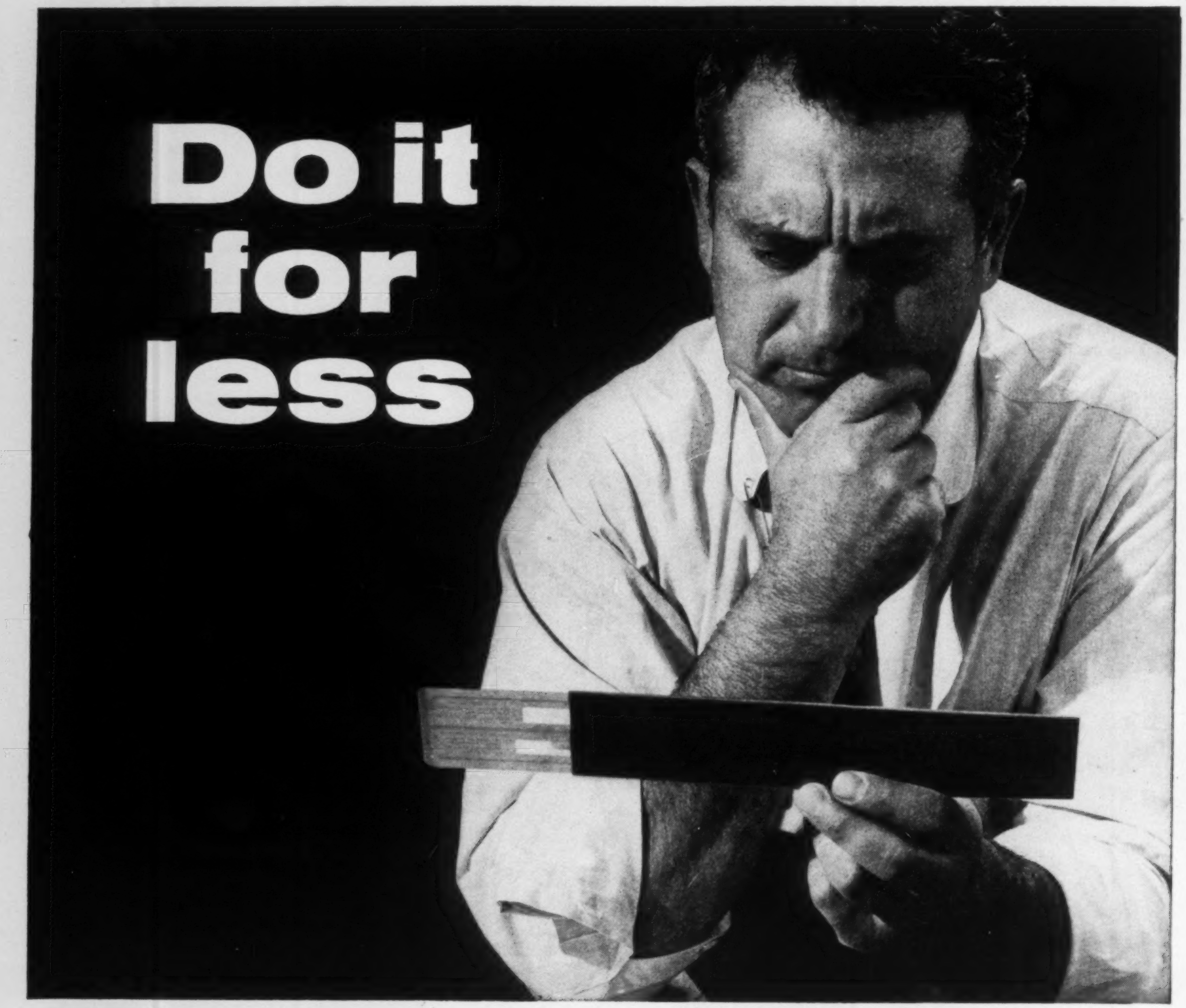
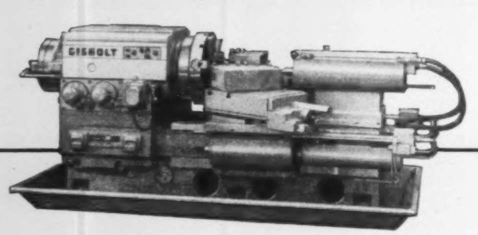
TEXACO



ON A GISHOLT AUTOMATIC CHUCKING LATHE



Gisholt Masterline No. 24 automatic production lathe

Rugged, versatile lathe for large parts—ring and bevel gears, bearing races, pellet mill forgings, oil country parts, diesel cylinder liners and heads.

Swing—35¾″...36″ between centers...Up to 125 hp motor for maximum metal removal with carbides.

Single- or multiple-pass JETracers add versatility, cut setup time and tooling costs.

Ask for Catalog 1213

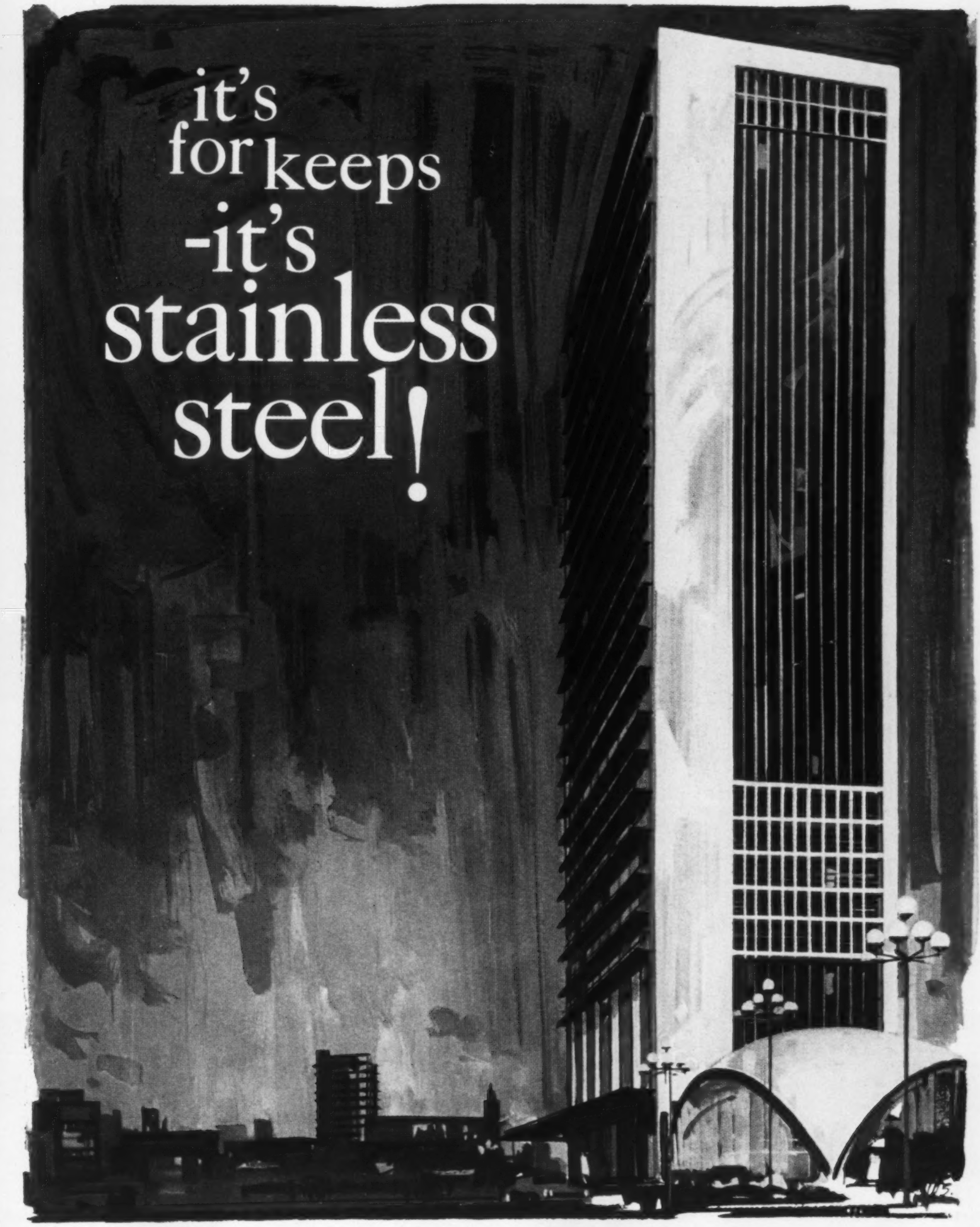
No matter how it's figured, old lathes can't compete with modern automatics. Low metal removal rates—wasted manpower—high maintenance—all cut into profits.

Lot sizes are no longer the deciding factor. JETracers and new, faster setup methods make today's automatic practical for long or short run operations. To meet your needs, Gisholt now offers six automatic turret lathes and four single spindle automatics.

Ask your Gisholt Representative to show you how the *right combination* will give you peak efficiency on first and second operation work and cut your manpower requirements in half!

GISHOLT
MACHINE COMPANY
Madison 10, Wisconsin, U.S.A.

Turret Lathes • Automatic Lathes • Balancers • Superfinishers • Threading Lathes • Factory-Rebuilt Machines with New-Machine Guarantee

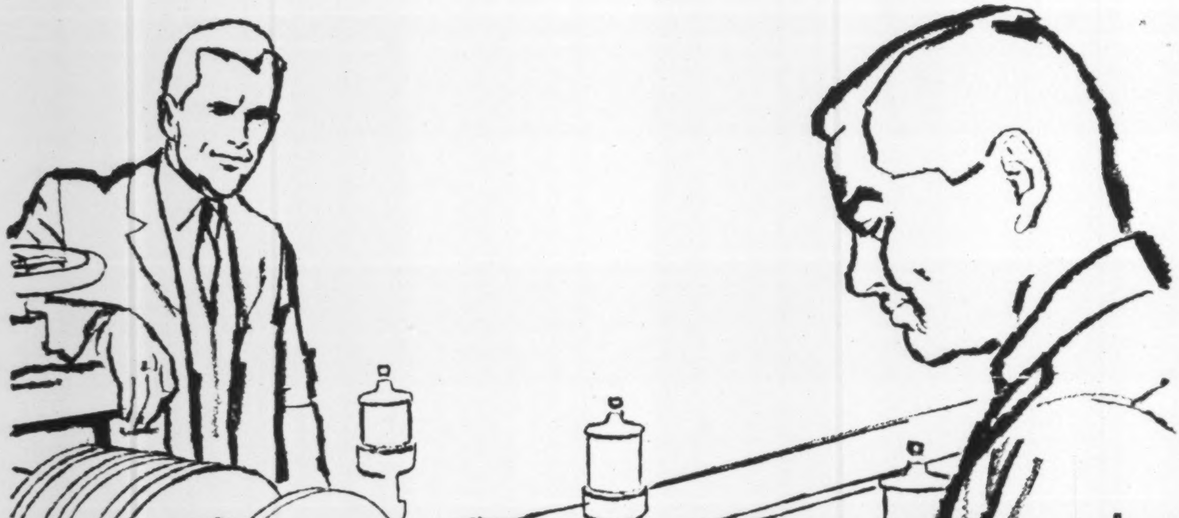

it's
for keeps
-it's
stainless
steel!

Stainless—the building metal of permanence, economy and beauty.
McLouth Steel Corporation, Detroit 17, Michigan

Look for the **STEELMARK**
on the products you buy

Stainless Steel

McLOUTH STAINLESS STEEL



Can you get longer edge life from your SLITTER KNIVES?

A·S·K for the answer!

AMERICAN SHEAR KNIFE

The answer is yes when you use slitter knives from A.S.K. (American Shear Knife Company). A.S.K. Slitter Knives last longer, stand up better under the heaviest jobs, reduce maintenance and replacement costs!

Why? Because A.S.K. has devoted years of research to the selection of proper alloys, and correct techniques in heat treating, precision grinding. For slitter knives that last longer, improve your slitting operation . . . Ask A.S.K.!

American
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FREE HANDBOOK—Want a handy reference on the installation, operation and maintenance of slitter, shear and chipper knives? A.S.K. has the answers in an 88-page manual. For free copy, write American Shear Knife Co., Homestead, Pa.

UNITED®

4-HIGH 2-STAND TANDEM TEMPER PASS MILL

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Progressive Leadership
United for Sixty Years

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Stedman Foundry and Machine Co. Inc., Aurora, Indiana

Designers and Builders of Ferrous and Nonferrous Rolling Mills, Mill Rolls, Auxiliary Mill and Processing Equipment, Presses and other heavy machinery. Manufacturers of Iron, Nodular Iron and Steel Castings and Weldments.

HEATING or MELTING LARGE VOLUMES of METAL?

NEW TRI-LINE* 180-Cycle Static Frequency Multipliers

extend induction power to a wider range of applications—often at lower cost.

If your production involves large-scale heating or melting, it will pay you to investigate the cost and performance advantages of Inducto Tri-Line 180-Cycle Static Frequency Multipliers. These medium-frequency units fill the gap between Inductotherm high-frequency and Inductotherm Linemelt low-frequency heating and melting equipment. In a wide range of melting, sintering, hot-pressing and graphitizing applications, they offer some unusual economies.

MEET CHANGING LOAD CONDITIONS. The Tri-Line's special transformers and controls, produce 180-cycle current from a balanced 60-cycle, 3-phase input with remarkable flexibility of output to meet changing load conditions.

SUPERIOR STIRRING—INCREASED PENETRATION. Tri-Line units generate stirring forces about 2½ times those of comparable high-frequency induction melting furnaces. You can now maintain the proper amount of stirring in large furnaces to assist in formulating many alloys containing metals of widely varying densities. Also, the increased penetration of 180-cycle power assures improved performance in heating relatively large diameter billets and dies.

*Trademark

CONVENIENT, SAFE OPERATION. Overloads cause no damage. Simple, virtually automatic operation is quickly learned by unskilled personnel.

GET FULL DETAILS. Inducto Tri-Line Multipliers are available with Kw output capacities, furnaces, heating coils and accessories to suit any medium-frequency application. For full information regarding efficiencies and economies in your particular job, ask to have an Inducto Field Engineer call.

Inductotherm Corp., 10 Indel Avenue, Rancocas, N. J.

STEEL SHELL FURNACES, available with any Tri-Line installation, offer significant improvements in rigidity and vibration resistance to greatly prolong lining life. In the illustration, pure nickel is being poured from a 5,000 pound steel shell furnace powered by a 500 Kw Inducto Tri-Line installation at Seaway Nickel Corp., N. Tonawanda, N. Y.

INDUCTOTHERM

Subsidiary for 60-cycle melting equipment—INDUCTOTHERM LINEMELT CORP.

THE FIRST CERTIFICATE OF APPROVAL FOR AUTO SMOG-CONTROL DEVICE was won by AC Spark Plug Div. of General Motors Corp. The device that won California state approval (and an opening to a tremendous market) is said to cost $4-$6 installed on a new car; $10-$40 on a used car. It returns blowby gases from the crankcase to the engine where they are consumed.

"MOST SALESMEN ARE ORDER TAKERS." This is what Commerce Secretary Luther H. Hodges last week told a meeting of members of the National Assn. of Manufacturers. He said, "There are too many soft spots. Too much self satisfaction with the status quo." Mr. Hodges claims the selling slump started during World War II. Then, the average company didn't have much selling to do.

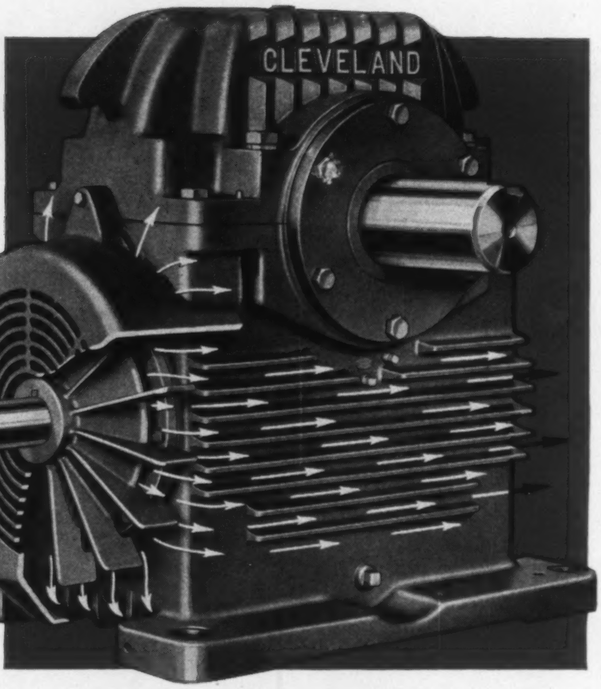
SOME MILITARY BUYING will be taken over from the Defense Dept. by General Services Administration. GSA will act as a single-manager procurement and supply agent for some civilian-type military supplies. The change will be in effect shortly.

STEEL MILLS CAN'T BANK ON HIGHER PRICES as the answer to their profit squeeze, says A. R. Maxwell, Jr., president, Pittsburgh Steel Co. For the smaller mill, at least, prices are not in the control of management, he claims. Management must concentrate on cost reduction in this situation. Says Mr. Maxwell: "This is the one thing we can control."

USE OF ZINC IN 1962 AUTOS is expected to increase by 10 pct over 1961 model usage. This is the estimate of J. L. Kimberly, executive vice president of the American Zinc Institute. This gain will reflect more use of zinc die casting, and galvanized sheet. The average full-size 1962 car is expected to carry about 80 lb of zinc die castings.

THE INDEX OF THE AMERICAN GEAR MANUFACTURERS ASSN. shows a 14.9 pct increase from July to August. The August index was 252.5 (1947-49=100) for new bookings, above the 1960 average of 235.5. August shipments index was 240.4, up from 200.1.

A HALF-MILLION DOLLAR MARKET FOR ELECTRIC POWER TOOLS will be helped by home workshop spending. Rockwell Manufacturing Co. makes this prediction in announcing a line of compact tools. The company looks for a 15 pct boost in its sales in 1962. It says the do-it-yourself market is anywhere from $3 to $15 billion.



Fan cooling for Increased HP Capacity is Not New... *to users of Cleveland Speed Reducers*

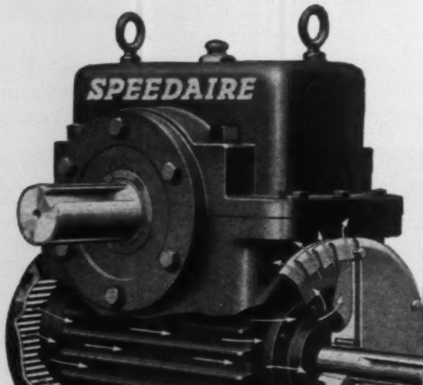
As far back as 1944, Cleveland Speedaire Worm Gear Reducers (shown in both the announcement ad and cutaway photo below) were providing industry twice the load carrying capacity then available from standard worm gear units of equal frame size. Even then, it was *fan cooling* that did the trick—because fan cooling was and still is the most practical method of heat dissipation.

On the new, higher horsepower Cleveland's (shown in top cutaway photo), a small, specially designed fan—equally effective in either direction of rotation—is located on the worm shaft's input side. Fan size and design permit a smooth, more effective flow of air beneath, above, and around all sides of the reducer.

Mounting the cooling fan on the worm shaft INPUT end is a very definite Cleveland advantage for when the fan is mounted on the *opposite* side, a second oil seal is needed. This results in additional friction loss due to seal drag—and is another point where oil leakage could occur.

Remember, it was Cleveland design engineers who pioneered both fan cooling and centrifugal casting of bronze gears—and after sixteen years of rugged field usage in all types of industrial plants, have now incorporated these features in all units (from 3 to 12-inch centers) of the new standard Cleveland Speed Reducer line.

Get the story of these new speed reducers from your Cleveland representative, or write today for free 36-page illustrated Bulletin No. 410 that contains complete engineering information. Either way, you will get the answer to improved speed transmission—at savings of 50% or more on per horsepower cost!



Announcing
A Fan-Cooled Worm Gear Speed Reducer
...the
SPEEDAIRE
by
Cleveland

A 1944 CLEVELAND AD
"Announcing A Fan-Cooled Worm Gear Speed Reducer . . . SPEEDAIRE."

CLEVELAND
Worm Gear
Speed Reducers

Cleveland Worm & Gear Division
Eaton Manufacturing Company
3270 East 80th Street • Cleveland 4, Ohio

EATON

Will Cost of Too Many Models Threaten Appliance Pickup?

Appliance makers toast each other on basis of major sales advances since mid-year.

But out in the plant, production men sweat over the cost of producing too many models.

By K. W. Bennett

▪ A burst of announcements indicates appliance makers have cracked their number one problem—low volume. In quick succession, appliance men are reporting a third quarter sales spurt that, in several cases, is startling.

For sales chiefs, it's great. For production men, facing an unprecedented explosion of new models, it may be their greatest headache year to date.

The Maytag company commented guardedly last week: "Preliminary tabulations at Maytag indicate that third quarter sales exceeded those of last year's third quarter."

Prospects Up—The Maytag statement is conservative. At Hotpoint Div., General Electric Co., general manager of sales and distribution J. E. Horak reports the last week of Hotpoint's third quarter was the biggest week the company had had in over three years. Hotpoint is enjoying its strongest nine months since 1957.

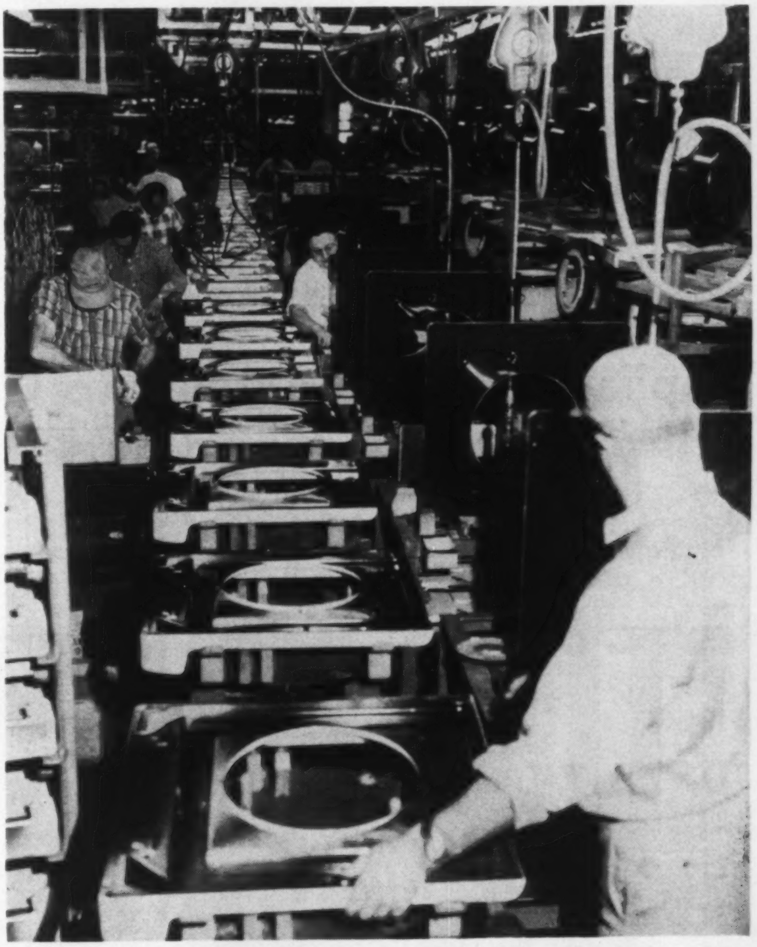
Board chairman Judson Sayre, Norge Div., Borg-Warner Corp., reports factory volume for September ran 59 pct over the year ago figure. The total for the year is running 34 pct over the 1960 period. Earlier comment suggests most of the gain was made without including at least one hot new Norge product, the coin operated dry-cleaner.

More Indicators — The industry giant, General Electric, says the sales outlook has been gaining steadily since February, and that dealer inventories are "if anything, a little low in some lines."

And Whirlpool Corp., calls the last two months "really outstanding." August and September halved the sales decrease for the year to date. This was in the company's own RCA-Whirlpool product line.

An encouraging report from The Tappan Co.'s treasurer P. I. Berno: "Our profits have been advancing since August. We spent $4 million in '59 for plant modernization, and the real payoff seems to be coming this year."

All of this, appliance makers



TOO MANY SPECIALS? Production men are fighting a tough battle. Problem: How to get low-cost production with short runs. (Maytag photo) agree, is good. It could kick off major capital equipment purchase programs that have hung fire since early 1960.

Too Many Models—But behind the scenes, 1961 is shaping up as the industry's toughest year in the race to produce new models in as many varieties as the sales department may request. Commented one veteran production chief, "Sure, any appliance company official will say he believes in the economies of 'short line' (limited model) production. The fact is, we're producing more different models than we ever have.

"Where will it end? I don't know. I can't see that it can. We're producing more models and more 'specials' (revamped versions of an existing model tailored to the specifications of a particular distributor) than we ever have. I'm positive it will be worse next year."

Commented Tappan's Mr. Berno, "The short run model, with its consequent increase in inventory, assembly worker costs, and obsolescence costs, is a major cost facing the industry."

Model Race—The model race, which began as a mild effort to introduce a few special models for the Christmas holidays in the Post-Korea period, caught fire in 1956-57. Appliance sales began to slip, when the appliance industry was loaded with finished goods inventories. The sales departments called for "specials" to lure customers back into the retail outlets.

One manufacturer, producing thousands of refrigerators each year, had 30 models in 1955. The company now makes 150 models, to which might be added 30 "specials" thrown in at the ninth hour to meet some newly discovered competitive threat.

"Special" Problems—With the introduction of "specials," the problem gets worse. It's estimated by some sources that, in a tough selling year, 30 pct of output of a given appliance may be "specials." Runs may be as low as 100 of a kind. Another estimate—only about 45 pct of total production will fit into the range covered by the two "middle standards," the two medium priced items at the center of a "four model line."

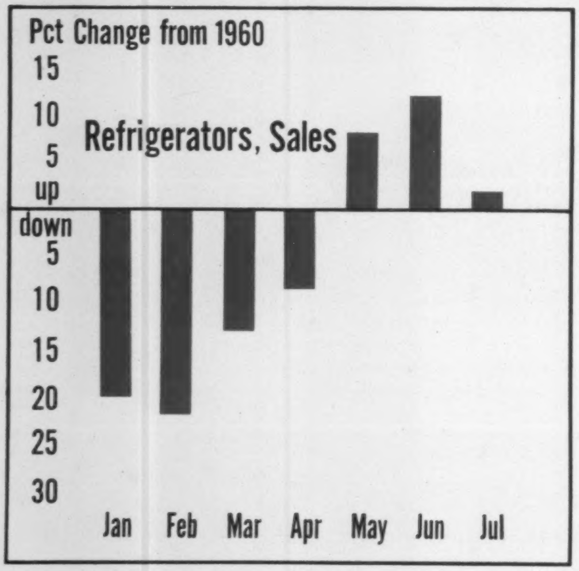
The problem applies to all major appliances, including ranges, usually regarded as a comparatively settled area of appliance manufacturing. Introduction of built-in ranges in 1955 touched off a model race in ranges that has grown stiffer each year since.

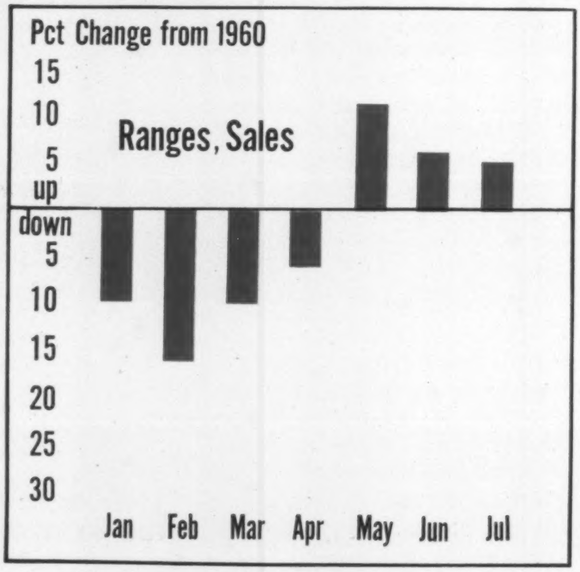
Scheduling Problems—One source estimates they are producing at least 30 basic models, to which must be added 25-30 specials. To this must be added five color variations. Since specials may be introduced as late as 60 days after model introduction, the problems in scheduling and expediting costs are grinding production men past the point of complaint.

One design co-ordinator points out that the special has become so common, that it is better economics to plan them when the original appliance design is completed. This cuts expediting costs.

Inventory Loads — The complaints, and they appear universal, are reaching even the level of market research. One marketing man points out that the need to have a variety of models for immediate delivery has boosted inventory levels of finished goods from 10 to 20 times over 1950 levels. This is in a modern operation, with excellent inventory control, with minimum stock needed to meet competitors' speed and variety of delivery.

Appliance Sales Continue to Gain





Where a warehouse handled 50 models 10 years ago, it now handles 500 appliance models. He'll further guess that though handling costs per item have been cut over 50 pct over the past five years by extensive capital input, total handling costs have gained 5 pct—exclusive of labor cost gains.

Tiger by the Tail—What's the solution? Most appliance men admit they have a tiger by the tail. A veteran appliance production chief points out: "We've squeezed every dollar out of parts and components making. We even buy steel by the bargeload, for the lower rates. We build new plants near steel mills. The only place left to cut cost is assembly. But how can you automate assembly, when you create more assembly jobs each year, and the jobs get more complex? We cut back manufacturing employment, then hire it back in the assembly department." Other appliance spokesmen aren't as negative, but most who aren't don't happen to be production men.

Several manufacturers already use computers to "balance" their production lines. This isn't a full answer, and a few are already planning to use computers to determine model mix on production lines. They agree that this isn't a full answer, either. It's the only one at the moment.

No Turning Back—On one fact, all agree. No producer can cut back on the number of models he produces, or the number of specials he's ready to throw in once the selling season is on.

Appliance makers point out they have to have volume to make profit, in today's highly automatic plants. To have volume, they must offer model variety. The other horn of the dilemma, and one that's just beginning to pinch, is that boosting model variety boosts cost and will eventually cut profit.

Service and Prices—Meeting the service cost problem head on, Norge this year offered a home laundry unit in which the motor can be removed in 10 minutes, a drive belt replaced in 2 minutes. Service call time is cut by one-third. Others are striking back. Ease of servicing will be a major point in 1962 selling.

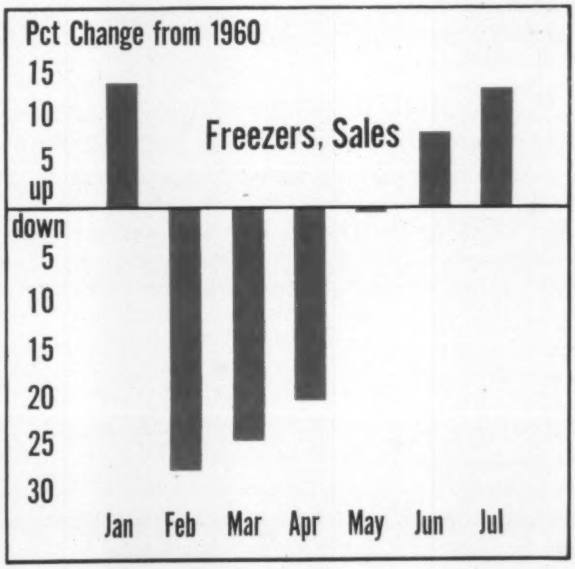
As sales volume advances, the industry push for higher prices is gaining strength. At least five manufacturers have boosted list prices on some items in recent weeks. Others hint that new model announcements will also push into higher price ground. If so, it'll be the first advance in the past two years. As of this week, general pricing remains soft.

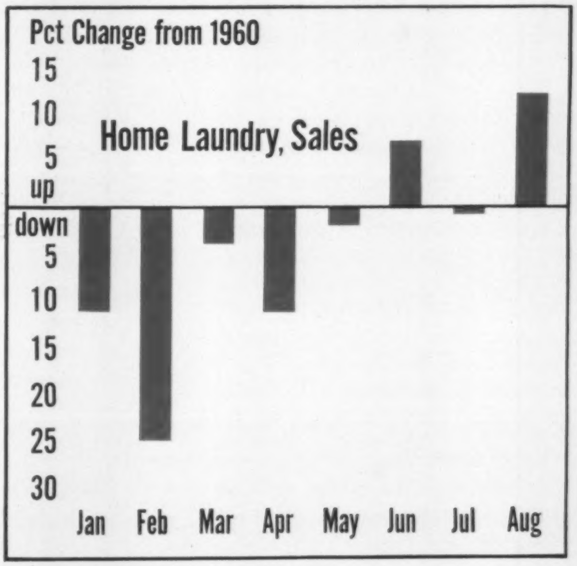
Looking at 1962—Bolstering the chance for a solid price advance, forecasters say, is a strong market outlook for first half 1962. High sales volume, in an industry geared to volume output, is expected to generate profit gains.

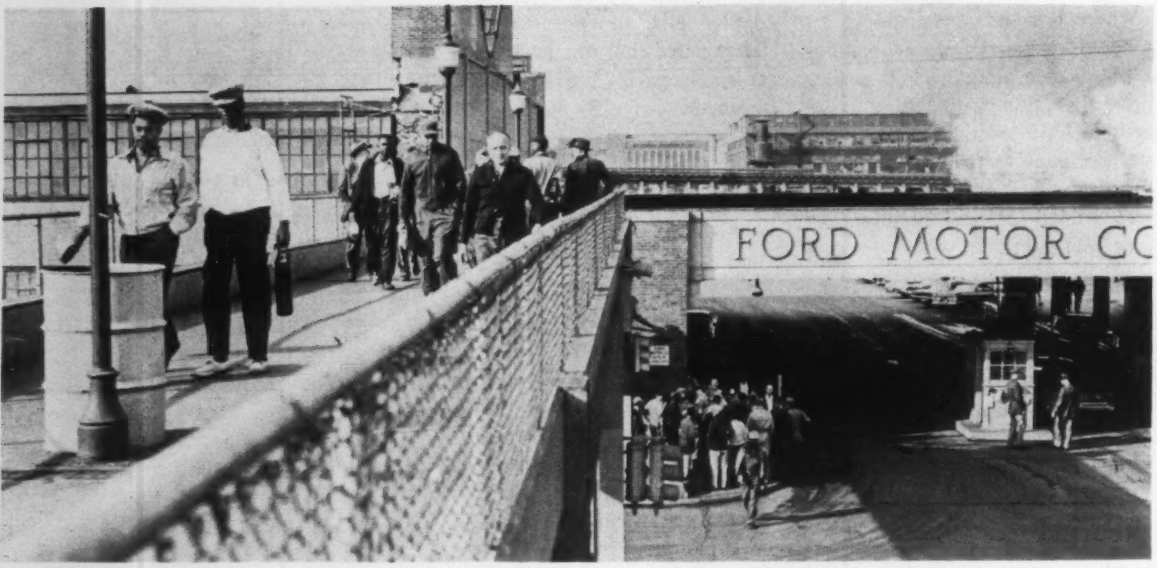
Though much has been said of the sufferings of appliance makers profit-wise, the real low point was in 1958 according to a number of appliance builders. By 1959, many leaders had recovered to hit their highest profit levels in the post-Korean period. In 1960, profits suffered. In 1961, it begins to appear they'll recover.

The appliance maker outlook for the near term is regarded as very promising. The big question in many plants—how long can the model explosion continue without making profit inroads? And will rising prices offset these costs? The appliance industry is looking for somebody who can solve the model tangle—but he can't reduce the number of models. If he has another method, he's in a sellers' market.

. . . Over Last Year's Sales Rates







WALKOUT STARTS: Ford workers at the giant Rouge plant start walkout. Steelworkers here are a special problem.

Ford Strike Hits Auto Output

Even an early settlement of the Ford strike could not prevent a big loss to October production.

Local issues again loomed as the big problem in auto labor.

By A. E. Fleming

▪ As Ford Motor Co.'s 120,000 UAW members left their jobs last week, the logical question arose: How long will the strike last?

The first authorized national strike of Ford plants in the history of UAW-Ford relations occurred when niether side could agree on non-economic bargaining issues.

UAW president Walter Reuther and Ford vice president of labor relations, M. L. Denise, expressed hope for settlement before the week was out. More pessimistic insiders were guessing the close-down would last at least as long as GM's two-week strike, perhaps a week longer.

Local Issues First—Their reasoning: Although the strike resulted from a standoff on non-economic issues, the aim seemed to be to try and wrap up local settlements in the hope of spurring settlement at the national level. And this was easier said than done.

Shortly before the strike hit on Oct. 3, agreement was tentatively reached on money matters. Reports were that Ford's economic offer paralleled GM's and was even better in some areas.

Still, as late as last Friday (Oct. 6), 46 of 85 Ford bargaining units still had to settle up. Their demands ran into the hundreds. Seventeen of the bargaining units, representing 30,000 workers, were located at the key Rouge plant in Detroit, which also houses Ford's steel works, and has been a perennial labor hotspot.

Steelworkers an Issue—At Rouge, a dispute over wages for some 3000 steelworkers presented a thorny problem. The company contended its steelworker's average rate of $3.78 is 73 cents more than the average for the steel industry as a whole. The union disagreed.

An anticipated settlement, however, was expected to be based on the consent to freeze wage rates for present workers, while lowering the rate for new workers.

The Schedule—Said Mr. Reuther: "Wherever practical, we're going to try to wrap up these (local) issues together here at the top. We're going to concentrate on local issues." He said demarcation—what work should be done by what skilled tradesmen—was a problem at about 20 plants.

As a result, both company and union teams last week were running up phone bills to speed up talks.

Production Losses — Meanwhile, industry hopes for output of 650,000 cars in October were diminishing. The 650,000 program was contingent on a quick Ford settlement. Before the strike, Ford had been turning out 40,000 cars a week and had planned to turn out 190,000 during October, the same number of 1962 models it had built before the strike started.

If the strike ran into mid-October, a shortage of 1962 model cars, particularly Fords, loomed.

Top Executive Earnings Sag

Metals and Metalworking Executives Hit Hard

Survey shows average chief executive of metals and metalworking company took salary cut of 1 to 4 pct in 1960.

Profit sags are cited as big reason for most cuts.

■ Sagging profits hit top metals and metalworking executives harder last year than the average chief executive in industry.

A survey by McKinsey & Co., Inc., management consultants, indicates top management earnings overall about the same as in 1959. But the average head of a metals and metalworking company was taking a salary cut averaging from 1 to 4 pct.

McKinsey reviewed the compensation of chief executives of 587 companies in 25 industries. Burton G. Person, one of the key men compiling the results, points out the real significance of the survey is found within the various industry groups rather than broad generalizations.

Steel Executives—For instance, compensation of top steel executives was cut an average of 3 pct. But this cut was generally confined to medium and large companies.

Chief executives of steel companies in the $30 million sales class actually improved their earnings an average of $4,000, and in the $100 million class by $2,000. But the average leader of a $400 million class steel company took about $7,000 less.

Despite his slight improvement, a top small steel company officer is still paid less than the all-industries average for this size company. He earns $61,000 to $63,000 as an average.

Profit Drop—Reason for the average drop in earnings of steel chief executive officers (CEO): An average drop in profits of 18 pct.

For industrial metal products companies the situation was somewhat reversed. Top executives of smaller companies took pay cuts, while top executives of larger companies made slightly more. And the entire range of the industry stayed slightly above the all-industries average.

The reason for the average drop of 1 pct in top salaries in this group is a little harder to spot since profits were up an average of 3 pct on 4 pct better sales.

Mr. Person explains: The drop in income of chief executive officers in industrial metal products was influenced by the turnover in this industry. About 13 pct of the companies surveyed had new leadership. Basically, these companies usually promote to the top slot from within and pay their new chief executive less than his predecessor.

Consumer Durables—A similar situation occurred in consumer durables. The average chief executive officer took 2 pct less income on 3 pct better profits. The turnover in this industry was 16 pct. And McKinsey reports the size of the company had less influence on the salary cuts.

The largest percentage drop among metals and metalworking industries was in non-electrical machinery. Chief executive salaries were off 4 pct, and the reason isn't hard to find. Profits were off an average 8 pct.

Profits of nonferrous metals companies were off 3 pct last year. And so was the income of the average chief executive. However, in the smaller companies the top officer held his own. The brunt of the cuts was taken by the ranking man in the medium and large companies.

The average metals executive takes a chunk of his earnings in deferred payments.

And, generally, top metals management is paid better than the average for all industries, by company size.

How Much Is the Boss Paid?

(Average Annual Compensation)

	Annual Sales			
INDUSTRIES	**$30 million**	**$100 million**	**$400 Million**	**$1 Billion**
Automotive	$57,000	$87,000	$142,000	$192,000
Consumer Durables	$58,000	$87,000	$137,000	$185,000
Business Machines	$72,000	$104,000	$161,000	$213,000
Industrial Metal Products	$67,000	$91,000	$130,000	$162,000
Large Diversified Companies	....	$97,000	$138,000	$178,000
Machinery (non-electrical)	$71,000	$88,000	$113,000	$131,000
Nonferrous Metals	$65,000	$100,000	$163,000	$228,000
Steels	$61,000	$97,000	$164,000	$232,000
Average All Industries	$64,000	$88,000	$128,000	$158,000

Source: McKinsey & Co., Inc.

Reynolds Takes on Canmaking

Aluminum Producer Will Make and Sell to Citrus Packers

Canmakers react to Reynolds' move into competition in canmaking.

Others in the aluminum industry take opposing views on wisdom of Reynolds decision.

By F. J. Starin

- Reynolds Metals took another big step into the frozen citrus can market last week. The aluminum producer announced that it will manufacture finished aluminum cans and sell them directly to packers.

Although Reynolds is the first producer to move full-scale into the canmaking end, others have made some moves in that direction. Alcoa, for example, is now quoting on can component material to go to in-plant operations. Alcoa is also leasing equipment to make paperboard and foil bodies for juices.

Reynolds is the first to go into the can business full scale. The company first demonstrated a mobile can assembly unit. Minute Maid Co. then announced it was installing a can aseembly line at Auburndale, Fla. Since then, other juice packers have installed assembly lines.

Can Makers React—Whether the other aluminum producers will venture into the canmaking business remains to be seen. There is considerable reluctance to go into competition with their consumers. And canmakers reacted immediately to the Reynolds move.

"Entry of Reynolds into canmaking puts them in a position of competing directly with their customers," a spokesman for Continental Can Co. told The IRON AGE. "Continental Can feels this is an unnecessary intrusion into the fabricating business, since established can manufacturers have been and are making aluminum cans freely available to Florida packers in the quantities they desire."

Two Sides—Throughout the rest of the aluminum industry, the Reynolds move finds most support in the middle management area. These men believe that the can companies have been too slow in developing the potential of the aluminum can.

Top executives in other companies, however, contend that, in the long run, the can companies are going to dominate the market and believe it is advisable to go along, rather than compete directly.

Others believe that there is no guarantee that the current pattern of can distribution is here to stay. This move, they feel, may eventually spark a change in the whole structure of the canmaking industry.

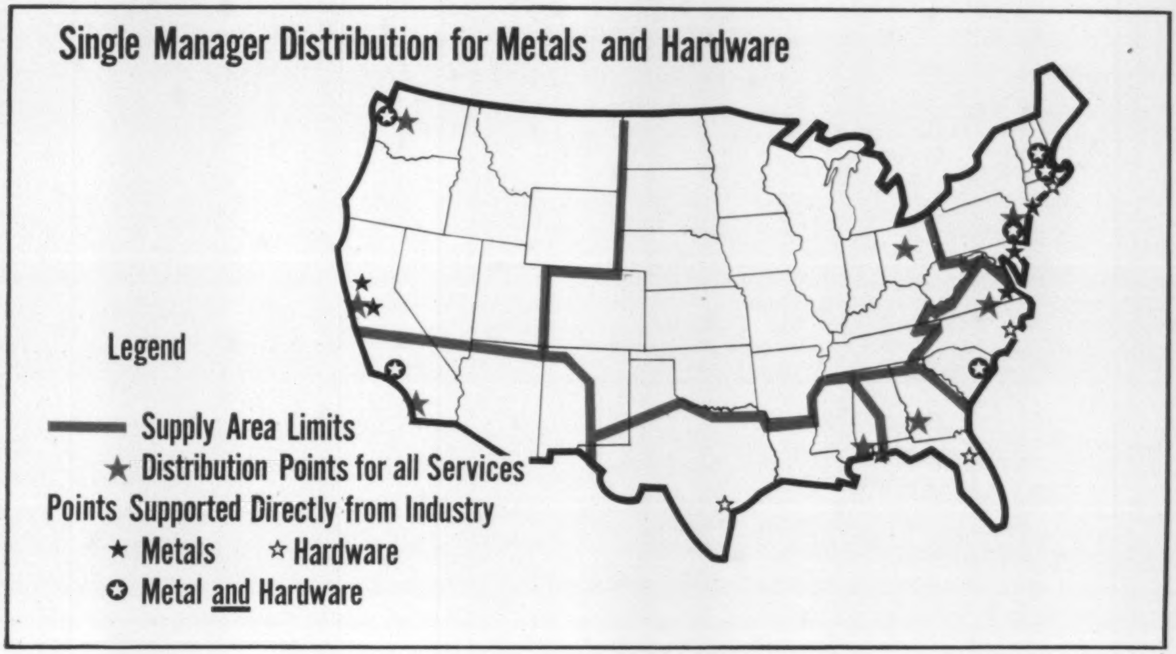
Compete in Price—The Reynolds cans will be priced competitively with containers of double-reduced or "thin" tinplate in both the 6 and 12-ounce sizes.

The lithographed sheet and fabricated can ends for the assembly operation will be produced at the company's facilities at Listerhill, Ala.

Reynolds says four can assembly lines are now operating. The combined monthly capacity of these four and the three new Reynolds lines will be 70 million cans.

Opposing Views—"We consider this move necessary to insure a supply of finished aluminum juice cans priced on the basis of raw materials economics," said Richard S. Reynolds, Jr., company president.

INTO THE MARKET: Reynolds contends that own lines and others like this at Minute Maid will be able to handle about half (70 million cans) of the Florida juice concentrate pack next season.


Single Manager Distribution for Metals and Hardware

Legend
Supply Area Limits
★ Distribution Points for all Services
Points Supported Directly from Industry
★ Metals ☆ Hardware
✪ Metal and Hardware

How Military Will Buy Hardware

Hardware buying for the armed forces is going under the single manager system used for metals and other products.

Military Industrial Supply Agency now studying which of more than 550,000 items will be included.

By P. J. Cathey

▪ Plans are moving ahead to centralize military buying of hardware products for all the armed services under a single agency.

When completed, the program will operate on the single manager principle now used for metals, paints, and other products.

Stock Points Set Up—Buying will be handled through the Military Industrial Supply Agency (MISA), located at 700 Robbins Ave., Philadelphia. Purchased products will be shipped to distribution points throughout the nation and stocked (red stars on map, above).

Military installations of the Navy, the Army, the Air Force and the Marine Corps will draw supplies from the points.

Some large users (naval shipyards, supply depots, and weapons plants) will be supplied directly from industry. These direct support points include those for metals (black stars), those for hardware (white stars), and those for metals and hardware (white stars in black circles).

Simplifies Buying—Aims of the single manager system include: Buying efficiency; standardizing materials; simplifying and reducing the number of items carried; and ending costly, time-wasting cross-hauling.

The hardware class will include fasteners, nails, metal screening, cabinets, abrasives, ball and roller bearings, rigging materials, chain and wire rope. Of all hardware items alone, 444,000 are used by one branch of service, 90,000 by two branches, 19,000 by three branches, and 3800 by four branches.

Review Process—MISA indicates 25,000 hardware items were reviewed by the end of the second quarter this year. Of those, 2800 were recommended for elimination because of duplicated buying, phantom order numbers, etc. The services agreed on about 1200 of these. The remainder will again be reviewed as the buying study proceeds.

Completed by '63—MISA points out of the total of 559,408 items in group 53 (hardware) about 70 pct will be centrally managed when the new system starts operating. The rest are special items directly tied to weapons systems and will stay under management of the military.

The hardware group will be implemented in stages with final completion scheduled for April, 1963.

MISA was established in 1959, reporting to the Defense Dept. through the Secretary of the Navy. Under a recent directive, it will be part of the new Defense Supply Agency.

FREE WORLD STEELMAKING: Hot-strip mill at August Tyssen-Hütte adds to West Germany's large steel output.

Report on W. German Steel

Mills Push Sales, Promotion As Steel Boom Loses Its Steam

As far as West German steelmakers are concerned, the Common Market in steel is over.

Price cutting by French and U. S. producers, revaluation of the mark, and wage increases have punctured the boom.

By G. F. Sullivan

▪ The honeymoon is over for West Germany's steel industry.

With the French selling steel for 10 pct under German mills in Germany itself, the head of the West German steel federation has charged that a "Common Market" no longer exists in steel. Further, Belgian and U. S. mills have been cutting prices on galvanized sheets and stainless steel, according to a top German steel company official.

Slowing Boom — Wages rose more than 8 pct last year; this year's revaluation of the mark added another 5 pct to export costs. The capital goods boom has lost some of its steam and customers are cutting back inventories. Shipments are running ahead of orders; backlogs are off.

The aluminum industry is doing a smart sales promotion and product publicity job. To make it worse, says a steel sales official, pointing to a half-page newspaper ad, "we pay for part of this ad because the aluminum company is owned by the government."

All of which suggests not chaos but normalcy for free world's second largest steel producer with a 34.7 million ton capacity. And the industry is doing a tremendous product publicity job, individually and through a special promotional group. (See box, next page.)

Cut Prices or Output?—The West German steel operating rate is above 80 pct. Business is still very good, though part of the high rate is due to the European practice of cutting prices to maintain output—which could eventually mean running at a

NEXT WEEK

French Machinery

Innovation and sales know-how characterize the French machinery industry. Next week's market report tells how it's doing, where it's heading.

loss—rather than laying off workers.

We asked Dr. Walter Cordes if he didn't think the U. S. practice of adjusting production to consumption was a better way. Dr. Cordes is a director and part of the top-management team of August Thyssen-Hutte ($350 million sales and 3.3 million ingot tons in 1960).

Labor's Strength—"Here, as in all other German mills, half the members of the board of directors represent labor. That is the law. This makes it almost impossible to lay off workers when you don't have enough business. Also, we compete in Europe against countries that have different price policies," Dr. Cordes explained.

"I believe in adjusting production to consumption. The Belgians do not. They export perhaps 75 pct of all the steel they make. In good times they charge what the traffic will bear; in slow times they cut prices," he added.

We asked a question on stainless steel because Dr. Cordes is also president of Deutsche Edelstahlwerke (1960 sales: $140 million). He smiled, "In stainless, too, I think we should adjust output and keep prices stable. But what could we do when U. S. companies began to cut stainless steel prices here?"

Electro-Galvanized Coming—The West German auto industry has not moved over to galvanized to the extent Detroit has, nor the steel inindustry to electro-galvanized. But both seem to be coming. Ford, Cologne, is going in for it; August Thyssen-Hutter is selling its 7000 tons a month Sendzimir hot-dipped capacity, will probably buy a British-built electrolytic line. Prices are weak, however.

What really riles West German steel makers is the way French mills are undercutting them on steel products in the backyards of the German mills. It is a problem of different sales taxes in the two countries, aggravated by the recent upward revaluation of the German mark.

Undercut by French—The French can deliver a ton of carbon bars to a given German city for $101, including $6 freight. This is 10 pct under the cost from a German mill, with less freight. This was not supposed to happen, under the terms of the treaty setting up the European Coal and Steel Community.

"Under such circumstances," said Dr. Hans-Gunther Sohl, president of the German Iron & Steel Federation, "one can hardly go on talking about the Common Market." Dr. Sohl is president of August Thyssen-Hutte. France supplied 18 pct of Germany's steel last year.

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How West Germans Sell Steel

In subject matter, depth and breadth of coverage, West Germany's steel product promotion is unique. So is its availability from a single source. Here are highlights of the industry's information program:

Application Booklets: Titles include, How to Make Radio Towers, Window Frames, Garden Tools; How to Weld Thin Sheet or Cut plate. About 240 booklets of from 4 to 100 pages each are available.

Film Strips: More than 100 film strips, with text, push various products. In addition, there are 12 sets of color slides describing steel processes for study by schools and colleges.

Films: The industry group has assembled a library of 16-mm films from many sources, has 93 on tap. There are half a dozen or more on rolling mills made by mill manufacturers.

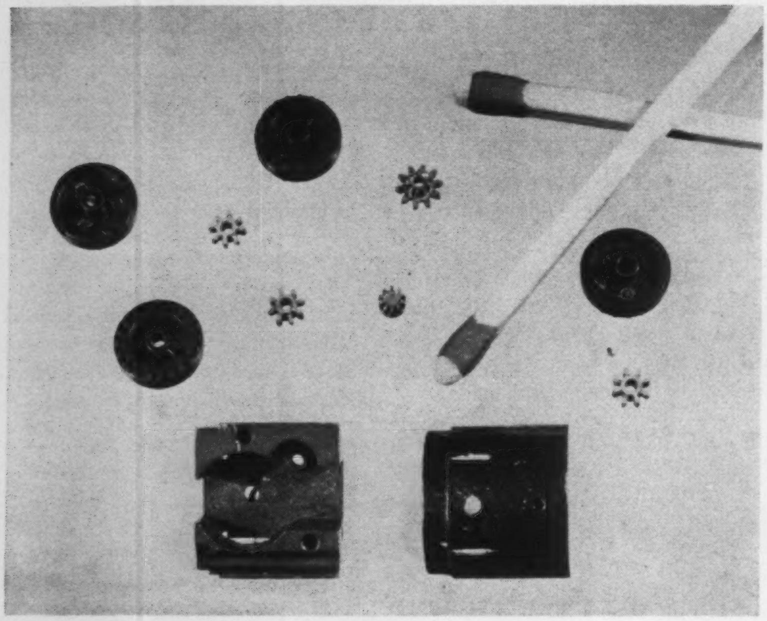
Monographs: These are more detailed than application leaflets. Latest is a 200-page book on steel wall sculptures. Like the balance of the program, they were started in 1955, so far 15 have been issued.

Other methods: A six-times a year magazine the size of "Life" or "Look," circulated to steelworkers and thought leaders; trade shows; photo files of over 12,000 pictures for the use of writers and editors.

PRESIDENT SOHL: There's no Common Market in selling steel.

STEELMAKER CORDES: U. S. mills are cutting prices in Germany.

Tiny Counter-Assembly Wins Award



YEAR'S BEST: A tiny counter assembly for an elapsed time indicator is 1961's "Zinc Die Casting of the Year," in the New Jersey Zinc Co. contest. It was die cast by Hadlock & Temte, Inc., of Chicago, for Bowmar Instrument Corp., Fort Wayne, Ind. The assembly consists of a two-piece housing, four counter wheels and five tiny gears, the smallest of which is a 10-tooth bevel gear, .063-in. in height.

U. S. Steel Gets Into Production Overseas

U. S. Steel Corp. is joining with Italian interests in its first production venture abroad.

With Terni-Societa per l'Industria e l'Elettricita, it will build a stainless rolling mill at Terni, Italy. The facility will have a capacity of 30,000 tons per year, with no melting plans at present.

Rising living standards have been pushing the growth rate of foreign steel far ahead of the U. S. industry. The market in some countries is expected to grow as much as 500 pct by 1975.

U. S. Steel is also joining in a study of the feasibility of building an integrated steel mill at Rotterdam.

Hanna Hikes Capacity At Groveland Plant

Hanna Mining Co. is increasing the annual capacity of its Groveland iron ore concentrating plant in Michigan, from 700,000 to 1.5 million tons.

It will also install facilities to produce 1.250 million tons of high grade partially fluxed iron ore pellets per year. It will be the first merchant iron ore beneficiation plant to produce partially fluxed pellets for the U. S. ore market.

Groveland, on the Menominee Range, produced 670,000 tons of concentrates last year.

U. S. Sells Less To Soviet Bloc

There has been a sharp decline in the value of goods licensed for shipment to the Soviet bloc in the past two quarters, Commerce Dept. reports. In 1961, license approvals (which do not mean goods are shipped), dropped from $23 million in the first quarter to under $12 million in the third.

In the past two quarters (or since the beginning of the current Berlin crisis), there has been a 40 pct drop in export license approvals from the average of the two previous years. September's figure was just over $1 million, a two-year low.

Contracts Awarded In Defense Buildup

Companies from coast to coast are sharing in the defense buildup, with recent contracts awarded to:

Vertol Div., Boeing Co., Morton, Pa.—$8.7 million for HRB-1 helicopters for the Marine Corps.

Westinghouse Electric Corp., at Sunnyvale, Calif.—$1.9 million for research and development on the Polaris missile launching system.

Pratt & Whitney Div., United Aircraft Corp., at East Hartford, Conn.—$2.6 million for trainer aircraft J60 engines.

General Electric Co., at Pittsfield, Mass.—$1.4 million for Polaris missile spare parts.

Conco Engineering Works, Inc., Mendota, Ill.—$1.012 million to manufacture practice bomb Mark 104.

Control Data Corp., Minneapolis —$1.135 million for Model 1604 computers and a 1607 magnetic tape unit.

Thiokol Chemical Corp., Bristol, Pa.—$4.303 million for liquid propellant rocket engines for Bullpup missiles.

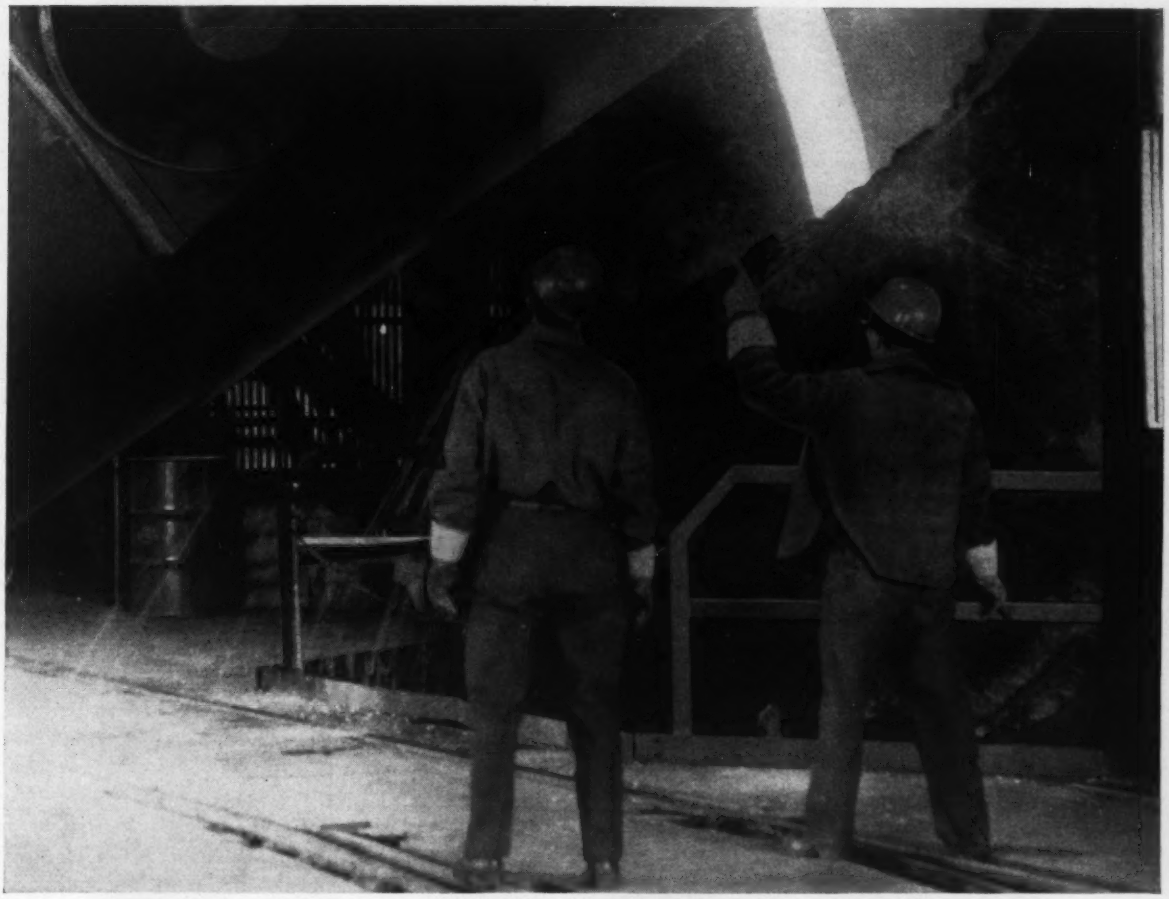
North American Aviation, Inc., Canoga Park, Calif.—$1.284 million for JATO rocket motors.

Douglas Aircraft, Santa Monica, Calif.—$6.9 million to develop a capability for air-to-air rocket fuse production.

Curtiss-Wright Corp., Caldwell, N. J.—$10.094 million for modification of propellor assemblies, related components and technical data applicable to C-124 and C-133 aircraft.

Compudyne Corp., Hatboro, Pa. —$1.9 million to fabricate 57 sets of hydraulic systems for the Titan II facility.

Aerojet General Corp., Sacramento, Calif.—$5 million for test and engineering analysis in support of engines for the Titan I.



A NEW ADVANCE IN DURABLE FLAME RETARDANT WORK CLOTHES

It takes the optimum combination of fiber, fabric, and finish to make the best possible fire retardant work clothing . . . and this combination has been achieved in a new *Mount Vernon Safety Fabric.*

The fiber is cotton – the world's most comfortable fiber: cool, absorbent . . . with no static electricity and no melting at high temperatures.

The cloth is a MOUNT VERNON fabric specifically developed for this use. It is designed for high strength, resistance to tearing and abrasion, and maximum air porosity . . . and to retain these properties throughout the life of the garment.

The finish is Lynrus FR-1*. It chemically combines with the fiber and the cloth to produce *Mount Vernon Safety Fabric.* It provides durable flame resistance that will last for the life of the fabric whether it is laundered or drycleaned. *Mount Vernon Safety Fabric* will not support flame. Afterglow in charred areas is negligible.

Mount Vernon Safety Fabric is mildew resistant, wrinkle resistant, and has bacteriostatic properties which tend to inhibit perspiration odor development. It is non-allergenic, non-irritating, and non-toxic. Because the fabric is soft and flexible, without a trace of stiffness or harshness, it can be styled into smart, comfortable work clothes.

These claims are supported by scientific tests; use the coupon to write for your copy of "Technical Facts About *Mount Vernon Safety Fabric.*"

Mount Vernon

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Mount Vernon Mills, inc.

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☐ a swatch of MOUNT VERNON SAFETY FABRIC, so I can test it myself.

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INDUSTRIAL BRIEFS

Nuclear Show—Engineers Joint Council, Inc., is moving ahead with plans for the 1962 Nuclear Congress & Atomic Exposition, June 4-6. It will be held in New York and will include papers and technical sessions exploring the utilitarian aspects in the use of nuclear industry. About 100 companies are expected to exhibit atomic products and services.

Institute Choices—W. J. Primrose, Jr., vice president, Dickey-Grabler Co., Cleveland, was elected president of the Pressed Metal Institute at the annual meeting. C. W. Cederberg and C. C. Caditz were elected first and second vice presidents, respectively. The Achievement Award went to Carter Higgins, president, Worcester Pressed Steel Co., a former president of PMI, and specialist in the "make or buy" approach in stamped parts purchases.

An important source for
North American high-speed
and specialty steels

ATLAS
STEELS

Cabra's Fourth—Copper & Brass Research Assn. has opened its fourth annual Achievement Awards competition. It honors outstanding developments in the application or use of copper metals in the U. S.

Security Chief—E. V. Huggins, vice president, Westinghouse Electric Corp., was reelected president of the National Security Industrial Assn. at the annual meeting. The Assn. of 500 companies maintains a close working relationship between American industry and the Defense Dept.

Plating Shift—Chemplate, Inc., electroless nickel plating specialist, has moved to a new $350,000 plant at 4355 Sheila St., City of Commerce, Los Angeles. All Los Angeles and Compton, Calif., operations are now under one roof.

Broad Step — Multi-Amp Electronic Corp. has moved to new headquarters and plant at Cranford, N. J. Research, manufacturing and design facilities will be broadened in the bigger quarters.

Better Service—Congdon & Carpenter Co. has opened a new metals service center at Natick, Mass. It will offer a complete stock of steel, stainless and aluminum.

Growth Program—Welded Tube Co. of America has begun a 50,000 sq ft addition at its Philadelphia plant as part of a $3.5 million expansion program. The new building, for processing and warehousing raw steel stock and finished welded tube, will be equipped with two overhead cranes and two cutoff machines.

Expanded Shell—Lebanon Steel Foundry is expanding its shell molding facilities at Lebanon, Pa. It's part of a major growth program which has nearly doubled shell molding capacity within a year. All Lebanon regular grades of stainless and low alloy steels are being produced now in shell molds.

Inco Award — International Nickel Co. of Canada, Ltd. has awarded Dravo Construction Ltd., Toronto, Ont., a multi-million dollar contract to design and build a new pelletizing facility at the Copper Cliff, Ont. plant. It is part of a $50 million expansion program undertaken by Inco at the plant. When completed in 1963, the new facility will have an annual rated capacity of 500,000 tons of high grade iron ore pellets.

Universal Center—A new $500,000 service center is being built at Lynwood, Calif., by Universal Molding Co., roll-formed metal product fabricators. It will permit Universal to expand its inventory of light-gauge metal angles, channels and tubes.

Modern Move—Spaulding Fibre Co. has begun a $2 million modernization and expansion program for its laminated plastics dept. at the Tonawanda, N. Y., plant. It follows a $1.250 million expansion of Spaulding's fabricating depts. and employee facilities.

Air-Space Branch — DuBois Chemicals, Inc., has formed an Air-Space Div. It will research, develop, manufacture, market and service specialized cleaning, processing and maintenance products for aircraft, missile and space industries.

Research Arm — Chicago Div., Kendall Co., manufacturer of polyken industrial tapes and protective coatings, is building a $1.5 million research center at Barrington, Ill. Emphasis will be on industrial adhesives and plastics.

Extra Tests—Associated Testing Laboratories, Inc., is building a 32,000 sq ft addition to its plant at Wayne, N. J. It will provide extra space for the company's environmental testing services and test chambers.

Plastics Expands — Spencer Chemical Co. opened a new plastics laboratory at the Orange, Tex., plant. It will consolidate the plastics technical program and speed up commercial introduction of new plastic resins.

Small parts for big equipment stand up better when they are centrifugally cast by Shenango

When manufacturers of rugged, heavy-duty equipment order bushings, bearings, sleeves, seals, liners, rings or other symmetrical small parts, they quite frequently specify Shenango centrifugal castings. There is good reason for this. Precision spin-casting by Shenango always provides a dense, even grain structure which means more resistance to shock and wear. Also, since Shenango operates one of the country's largest and most modern and efficient centrifugal foundries and machine shops, large orders are filled with speed and precision. Send us your inquiry today.

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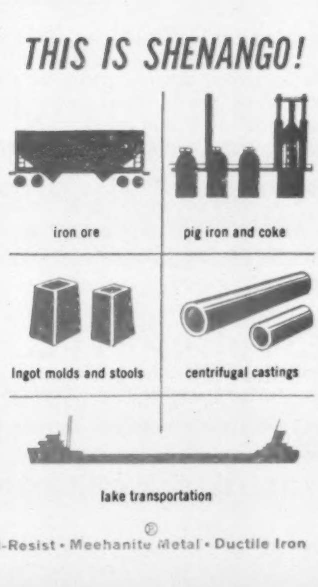

HARRIS CS-750

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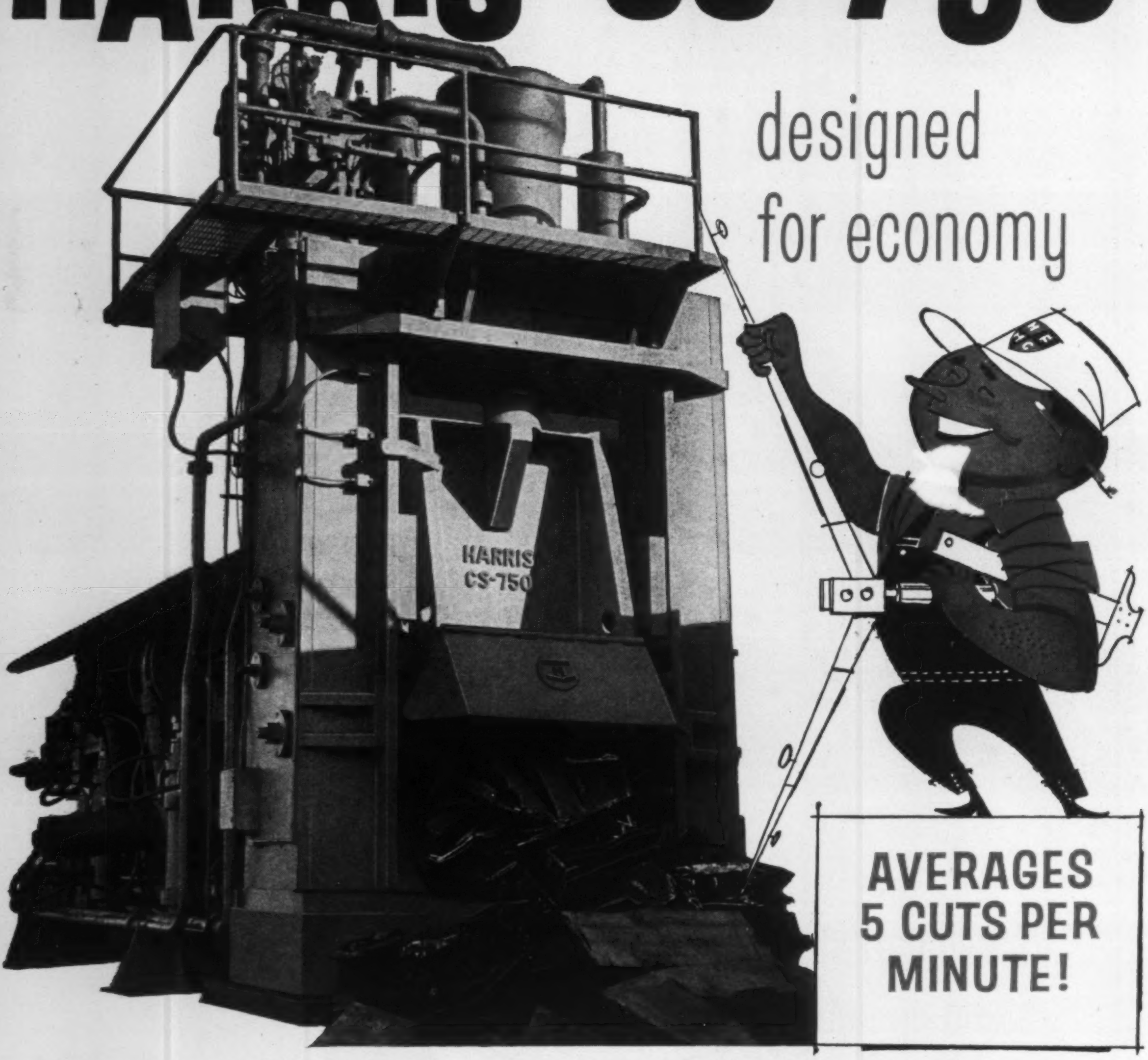

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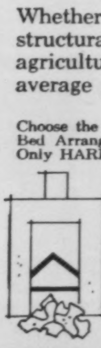
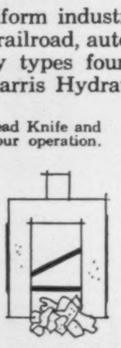
Choose the Hydraulic Shear Crosshead Knife and Bed Arrangement best suited to your operation. Only HARRIS makes this offer.



Inverted Vee Head
Flat Bed

Horizontal Head
Vee Bed



Guillotine Head
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Are Your Employees Listening?

Money spent on employee communications can be wasted unless programs are planned.

Put messages into "time-card" talk, base campaigns on employee interests and beliefs, match words with action.

- When management speaks, are the employees really listening? And how much of management's message gets through—and is believed?

These are important questions when you consider the amount of money spent on employee communications. Each year thousands of dollars are invested in news letters, special bulletins, and house publications. Funds are spent for leaflets, exhibits, and films.

But often, even managers themselves are discouraged with the results. Why?

Jobs, Not Profits — One major failure is the inability to talk in the employee's own language. Another is stressing ideas in which the employee has little interest. An example is talking about profits, rather than jobs or benefits.

In a recent speech, Yale J. Laitin, president, Survey Research Associates, Scarsdale, N. Y. outlined some results of employee attitude surveys.

Among other things, he pointed out, they reveal "management stresses how important it is that each man do his job well in order to build company profits. But most workers have little direct interest in profit. They sense they have little impact on company earnings.

"They are aware that one small mistake by a manager will result in a cost to the company several times more than their annual pay. . . . Yet, these same people will respond to the real objectives of the business, to the customers' needs for quality, for speedy delivery, for something special and extra. They will because this is sensible and understandable."

The Competitive Man — One large ball-bearing company, SKF Industries Inc., Phila. has hammered away at this theme in a campaign stressing The Competitive Man. Material is written in what one company executive calls "time-card talk." Language is down to earth, asking, "Who do you agree with?" not "With whom do you agree?"

Displays, posters, speeches, meetings, bulletin board notices, and house publications are used to stress the need to compete successfully against domestic and foreign competition.

Benefits for All—Some of the results: Company work groups successfully underbid outside sub-contractors. Maintenance crews also keep jobs "at home." Arbitration cases pending with the union have dropped in five years from about 250 to 9.

The SKF program is successful because it is realistic, built on employee beliefs. Material is developed in terms they can understand: Work going outside to contractors is work lost by company workers. Loss of sales means loss of jobs. The more quality workmanship, the more quality products.

. . . Keep These Aims in Mind

- When management doesn't get its message over, what's wrong? Three areas for failure are pointed out by Dr. Samuel N. Stevens, president, Stevens, Thurow, and Associates, Chicago in a recent address to the Producers' Council at Pittsburgh.

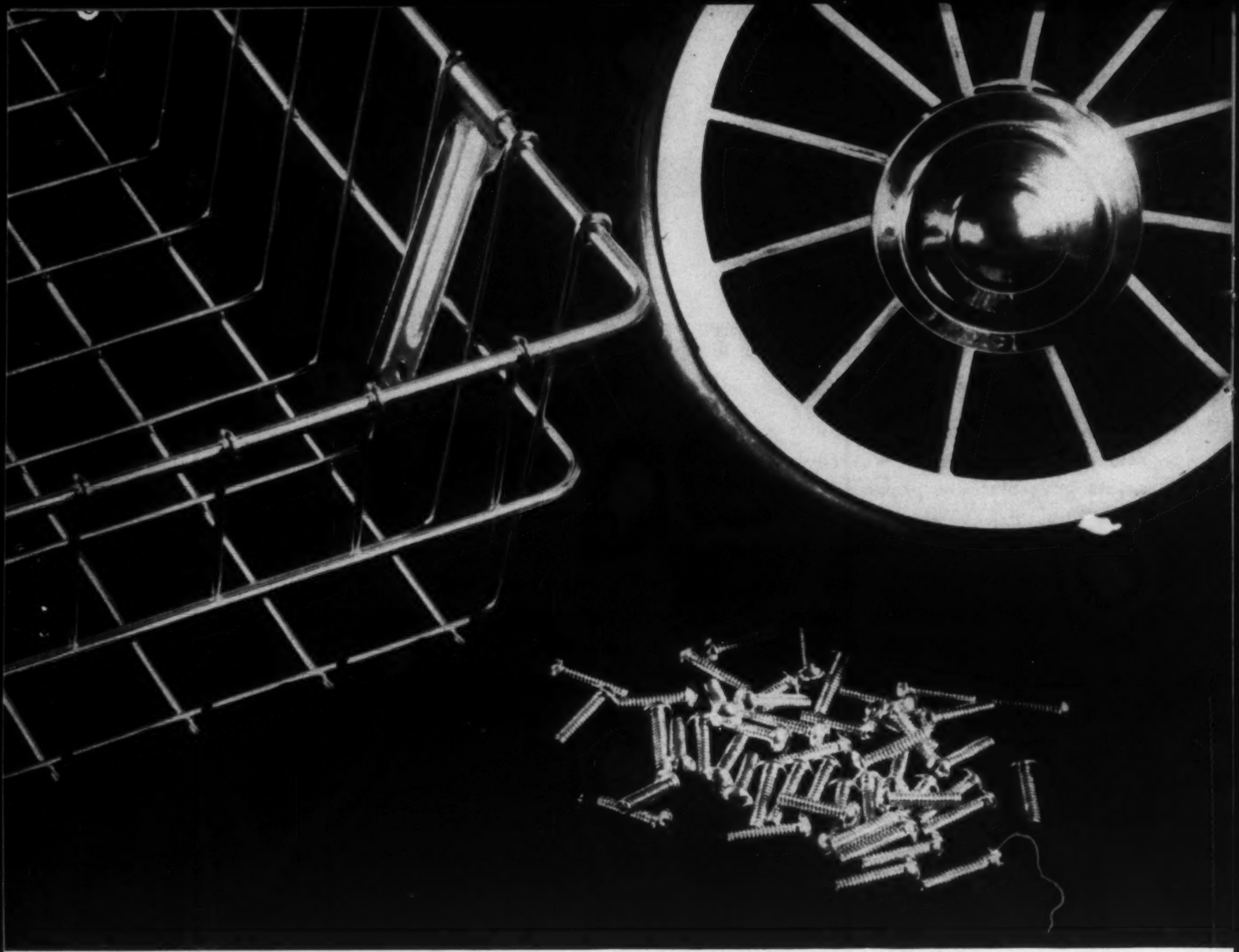
Here they are:

Unless there are clearly defined goals and objectives, programs are not likely to get maximum effectiveness. "The omnibus method of communication has the same result in influencing thinking that using a shot gun, instead of a rifle, has in certain kinds of hunting. Communications that cannot be easily read or understood will inevitably fail in meeting their mission."

What you do speaks louder than what you say. "There is often too great a gap between the expressed philosophy and the operating principles of management in day-to-day practice and the statements made from time-to-time concerning its position and intentions."

Management frequently fails to develop clear-cut, consistent statements of policy, effectively adapted to the specific conditions found in the organization's divisions.

"It's clear there must be a logical development of a management philosophy, which becomes the foundation on which the policies, plans, and practices of the corporation are erected."



Only M&T offers such a complete "package" for high quality, low cost zinc finishes

A zinc finish on certain products, such as the ones illustrated, is often a better choice than a painted finish . . . or improperly applied bright chromium. That's because it protects the base metal longer under corrosive conditions. What's more, it is applied at only a fraction of the cost of a chromium finish. For such a high quality low cost finish, M&T now offers you this complete package:

First, there's a new M&T Zinc Plating Process. It includes unique M&T Zinc Brighteners. Not only do you plate with remarkable brilliance, but also cover items uniformly, even in recesses.

Then, you have a complete choice in M&T chromate treatments. Unichrome Clear Dip imparts chromium-like lustre and color. With M&T's Dyed Dips, you can produce a rainbow of metallic colors. And there are others for black, olive and brass colored finishes; in fact, the M&T line of Unichrome Chromate Dips is among the broadest to be found.

Finally, to increase protection against wear as well as corrosion, if the service requires it, there's a group of outstanding Unichrome Clear Enamels. These are no ordinary organic coatings. They're designed for metals, and have proved their quality and durability in exacting jobs for over 20 years.

Experienced service, a *complete* line of supplies and quality results . . . good reasons to call in M&T if you have wheels, wire products, hardware or other products that can be finished better with zinc. Send for data on M&T's zinc finish "package."

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Where Did the Auto Steel Go?

New Cars Are Smaller, and the Trend Will Continue

This rundown of Ford Motor Co. cars shows where some of the missing steel tonnage went.

The new cars are smaller. This goes further than the trend to compacts. The so-called standard sizes use less and less metal each year.

By A. E. Fleming

- Cars are getting smaller, and so is the amount of material that goes into them.

Suppliers of steel and other metals are sprouting gray hairs trying to figure out the tonnages they lose annually because of compact cars.

Losses Bigger Than Expected—Estimates are that compacts cut the amount of steel shipments by several hundred thousand tons a year—an amount which would be added annually to steel output if all cars were standard size.

Now, the standard size is being reduced. Opinion is that in the next couple of years, such models as the Ford Fairlane and Chevy II will move into the slots presently occupied by lower-priced series of regular Ford and Chevrolet models.

And materials use will fall farther on a per-car basis.

What's in a Car?—A look at the basic body weights of Ford Motor Co. four-door sedans indicates the comparative steel needs of the compact car (Falcon and Comet), the new "in-between" car (Fairlane and Meteor), and what is currently thought of as the standard car (Galaxie, Monterey, Thunderbird and Lincoln).

The basic body at Ford includes windshield glass, instrument panel, garnish moldings, door locks and handles, paint and side frame members. Most, but not all of the weight is steel. In the Lincoln, for example, the windshield weighs 39 lb, front door glass 15.5 lb, and rear door glass 16.9 lb. (Lincoln's front door frame is 22.4 lb).

The Weights—Thus defined, the body weights of Ford Motor Co. four-door sedans are: Falcon, 960 lb, Comet, 1081 lb; Fairlane, 1177 lb; Meteor, 1211 lb; Ford Galaxie, 1314 lb (plus a 301 lb steel frame for a total of 1615 lb); Mercury Monterey, 1368 lb (plus a 309 lb steel frame for a total of 1677 lb); Thunderbird, 1321 lb; and Lincoln 1759 lb.

Reason for the added frame weight in the Galaxie and Monterey is that they have separate bodies and frames, while the other models have unit bodies, or combined bodies and frames.

Smaller Engines—Engine weights also are shrinking. Ford's "thin-wall" V-8 engine, an option on the Fairlane, weighs 450 lb, almost 100 lb less than the V-8 introduced by Ford in 1932.

Displacement is the same, 221 cu in.

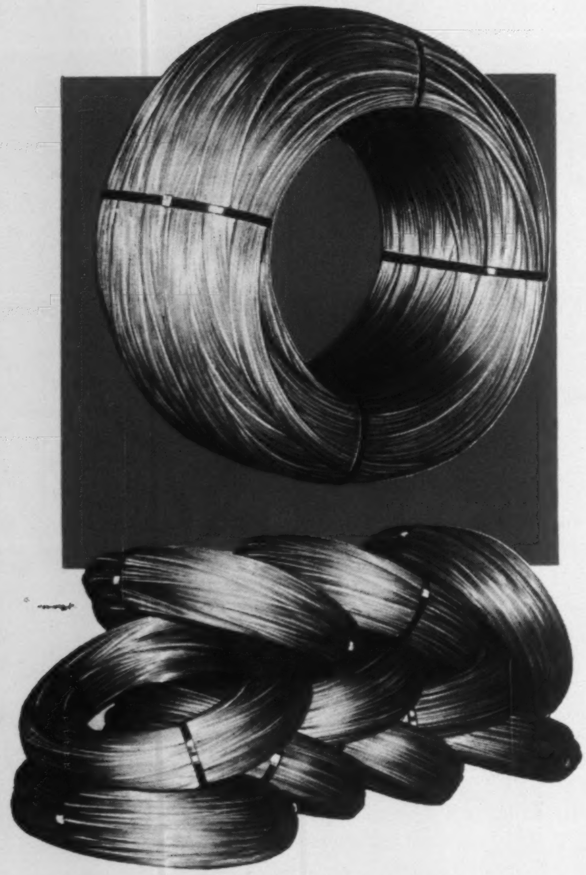
Current weights of the "running" engines, or as they would perform on test stands, are: Falcon and Comet 144-cu in. Six, 352 lb; Fairlane 170-cu in. six, 372 lb; Meteor 170-cu in. six, 373 lb (different engine mounts than Fairlane); Galaxie 292-cu in. V-8, 611 lb; Monterey 292-cu in. V-8, 613 lb (different engine mounts than Galaxie); Thunderbird 390-cu in. V-8, 647 lb; Lincoln-430 cu in. V-8, 755 lb.

Evidence of the New Trend

IN BETWEEN: Ford Fairlane is in the "in between" class in auto sizes, between the compact Falcon and larger Galaxie. Introduction: Nov. 2.

In Brite Wire Fabricating—*here's how advantages of* DSC-Portsmouth LPR® Coils *over short-run bundles show up in your*

❶ space,
❷ handling,
❸ unit manufacturing
❹ and material costs



The LPR Coil at the top contains 2955 lbs. 11 ga. spring wire. It occupies a space of 24.5 cu. ft.

The 10 bundles in the lower picture weigh 3050 lbs. (also 11 ga. spring wire). They average 305 lbs. each and, even as "ricked", occupy a space of 90 cu. ft.

1-space: The pictures at the left show how the small bundles waste 65.5 cu. ft. out of 90 cu. ft. That's 72.8%. What's more, LPR's are self-supporting and readily accessible.

2-handling: With LPR's (1000 to 4200 lbs.) you make fewer moves for a given weight of inventory. Users report up to 80% saving in unloading time alone.

3-manufacturing cost: LPR's cut your downtime frequency as much as 95%. That means you produce more per man-or-machine hour. Users report up to 33⅓% increase in productivity and proportionately lower unit man-hour costs.

4-unit material cost: The needless coil changes you avoid reduce the remnant scrap you generate by as much as 95%. As your yield goes up, your material cost per unit drops.

Care for proof of LPR savings? Ask your nearest DSC Customer "Rep" or write: Detroit Steel Corporation, Box 7508, Detroit 9, Michigan

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What Electronics Boom Means

West Coast to Get Bigger Share of Electronics Billions

Electronics has already passed the aircraft industry as the No. 1 factory employer in L. A. area.

But it isn't an easy business to move ahead in. Many problems have to be solved.

By R. R. Kay

▪ There's good reason for excitement—and caution—in electronics. This industry with over $10 billion in sales has only one way to go: Up!

Industry leaders predict business will zoom to $20 billion by 1969. Digital computer factory sales alone will leap from last year's $½ billion to $4 billion by 1965.

But the road won't be smooth. Knotty problems are rearing their heads.

Bigger Role—One sure bet: The Farwest will play an even bigger, stronger role in the industry's future. It already totes up $2.8 billion in sales and hands out paychecks to better than 20 pct of the industry's workers.

It is, in fact, a major prop for the Farwest's economy.

Trend: Industry leaders agree most of the products now on the market will be old hat in a few years. The whole region is seething with new ideas in electronics.

Old Names—What about the employment picture? It, too, points up the Farwest's growing importance. Just a few months ago, the electronics industry became the No. 1 factory employer in the Los Angeles area. For the first time, it ran ahead of the historic leader, aircraft.

But the old-line airframe firms are in the act in a big way. Boeing, Douglas, General Dynamics, Lockheed, North American, Northrop, Ryan—all are in it up to their necks.

These firms have a big advantage. They're old hands at military work. This market makes up 70 pct of electronics sales. And look for more and more defense dollars to go into electronics.

Problems Listed—How about the problems? Some big headaches are developing:

(1) Reliability of products. It's especially critical in the military field. Example: A satellite program was set back three months by a speck too much solder on a few diodes.

(2) Need for better management. Technical know-how isn't enough to keep you in business. The industry seriously needs men who can handle today's marketing problems.

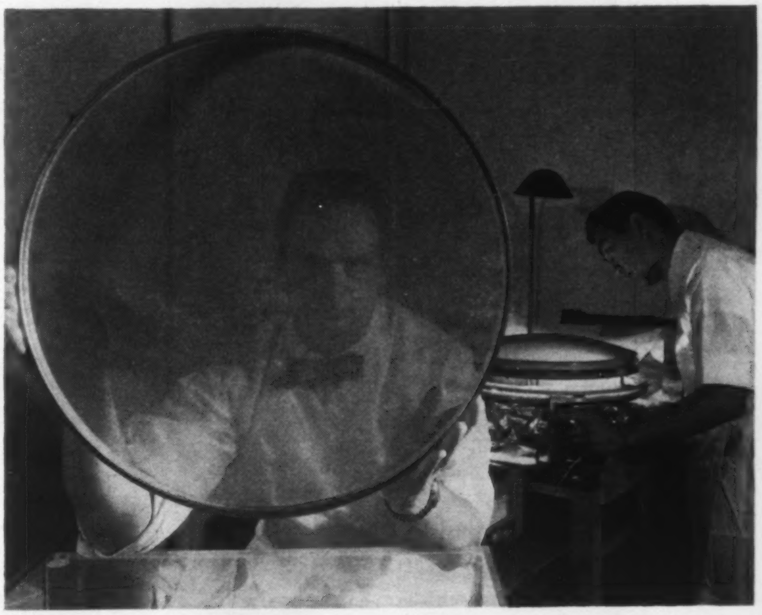
(3) Competition. It's fierce. Some products are overproduced. Drastic price-cutting is going on.

Watch for a shakeout of many firms. They'll fade away either by bankruptcy, sale, or merger.

The future shapes up for fewer firms with more overall savvy. Right now, the electronics industry is loaded with small companies. Of the Farwestern firms, 15 pct hire 20 or fewer employees; 21 pct have 21 to 50; and 16 pct, 51 to 100.

Biggest group is the 101-250-employee firm. It accounts for some 22 pct of electronics companies there.

New Lab Offers View of the Future



STORAGE SPACE: Storage mesh developed for a 21-in. storage tube is examined at Hughes Aircraft Co.'s new research lab at Malibu, Cal. The new lab is called a "sanctuary" of pure and applied research.

CRANE

DESIGNERS

CRANE

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CRANE

Counselors

Since 1910

In designing and building cranes since 1910 this company has adhered to a policy of thoroughly studying each problem presented from the standpoint of conditions faced and service to be rendered in order to recommend the proper type of crane and equipment.

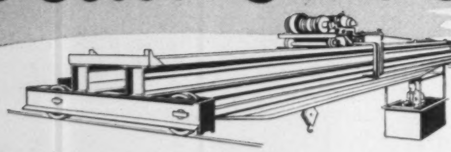
Growth in future demands is also considered and it is significant that some of the first Euclid Cranes manufactured are still in service. Impressive, too, is an uncommon record of repeat orders.

Euclid has the experience to study needs and render sound counsel to crane user; also engineering personnel and factory facilities to translate the facts obtained into equipment of the highest order.

You are invited to avail yourself of this counsel and can do so without entailing any obligation.

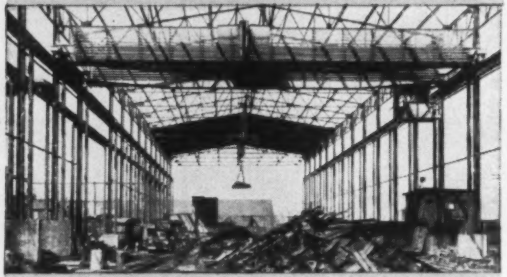
The EUCLID CRANE & HOIST Co.
EUCLID, OHIO

Euclid Cranes



ELECTRIC HOISTS, Also

Euclid Overhead Crane and Semi-Gantry Crane serving the assembly floor of a large machinery manufacturer.



Outdoor Crane equipped with two hoists; also facilities for operating both magnet and scrap iron grapple.

Indoor-outdoor, center controlled crane operating in a large shipbuilding plant.

Underslung, floor controlled crane designed to afford maximum use of a material warehouse.

New Lines Smooth Sales Cycles

How Natco Diversifies to Ease Business Ups and Downs

Company broadens its lines of products, adds new facilities in diversification move.

However, Natco stays within the machinery field with its new products and plans.

By R. H. Eshelman

VERSATILE: Natco president N. M. Forsythe, left, and vice president John Keats examine one of the company's new products. This tape-operated drilling, boring, milling unit is example of new lines added by the builder.

▪ With the long-term leveling trend of machine tool business in the past few years, many of the old-line companies in the field are beginning to diversify. This step takes a number of forms. The National Automatic Tool Co., Richmond, Indiana, for example, is broadening the product lines it has offered. But they are all still in the machinery field.

At the company's recent 60th anniversary, H. W. Bockhoff, board chairman and N. M. Forsythe, president, unveiled a variety of new products. Mr. Forsythe noted that about 55 pct of the company business has been in the automotive, high-production area.

A Pioneer—In fact, the firm is generally credited with having produced the first Detroit-type automation back in 1932. That year Natco developed what it terms the "world's first integrated transfer machine" for an automobile manufacturer. The unit bored some 9.5 million engine blocks before being retired.

States Mr. Forsythe: "We have faith in the future of the machine tool business." To confirm it, the company recently purchased a new and ultra-modern plant with over 360,000 square feet of manufacturing area, plus an office and design area of some additional 40,000 sq ft.

New Products Developed—"With this expanded space," continued the company president, "we have also made moves to diversify, to be less dependent on the industry's ups and downs."

One of the most profitable new lines has proved to be plastic injection molding machines, where the company has carved out a niche near the top. Other product lines added include mechanical and hydraulic-type precision honing machines, induction heat treating units (through cross licensing with Delapena of England), and two sleek entries for the hot numerical machining race.

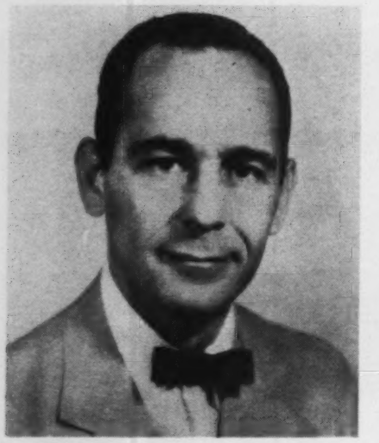
Work Under Water—Production case hardening of gear teeth under water is an interesting possibility of one heat treat machine. It minimizes distortion, always a problem on these parts. One of the numerical control machines is a versatile, single-spindle unit designed by Natco with an automatic tool changer. This is capable of handling 32 different tools.

The other tape automation job is a twin-spindle, heavy-duty precision unit being made through cross-licensing with Ateliers G.S.P. of France.

Reports Mr. Forsythe, "We see many signs that machinery business is now ready to make a comeback in the months ahead.

"We are ready with the machines."

MEN IN METALWORKING



I. N. Palley, elected executive vice president, Curtiss-Wright Corp.

Kennecott Copper Corp.—C. D. Michaelson, appointed vice president, mining; G. B. Russell, appointed treasurer and comptroller.

Tri Metal Works, Inc.—Stephen Bukata, named director, research and development.

Detrex Chemical Industries, Inc.—Louis Schlossberg, appointed research manager, Chemical Processing Div.

U. S. Industries, Inc. — S. B. Kaynor, elected secretary.

Pittsburgh Piping & Equipment Co.—R. R. Wischmeyer, appointed vice president, construction.

Bendix Corp.—A. J. Raymo, appointed director, manufacturing, Kansas City Div.

Aluminum Co. of America—J. W. Wilson, elected president, Alcoa International, Inc.; J. M. Mitchell, named vice president in charge of the international dept.; S. T. Gustina, elected vice president.

Air Reduction Co., Inc.—Andrew Kaul III, elected a director.

Towmotor Corp.—D. M. Wessman, named asst. to the executive vice president; A. H. Roth, named manager, marketing and advertising; W. L. Utley, named asst. to the president.

Motorola Inc. — H. L. Marrs, named vice president, sales, Communications Div.; W. J. Weisz, named vice president, Communications Products, Communications Div.

Union Carbide Corp.—C. E. Larson, appointed vice president, Union Carbide Nuclear Co., and general manager, Oak Ridge operations.

G. E. Sigman, appointed vice president in charge of industrial relations, McLouth Steel Corp.

Eastern Stainless Steel Corp.—W. T. Swomley, appointed vice president, in charge of finance; E. L. LaGrelius, appointed plant manager.

H. K. Porter Co., Inc.—L. C. Collingwood, appointed manager, Alloy Metal Wire Works, Riverside-Alloy Metal Div.

Altamil Corp.—A. M. Mitchell, appointed general manager, Aluminum Forge Co. Div.

Synthane Corp.—J. H. Coulter, Jr.—named project engineer.

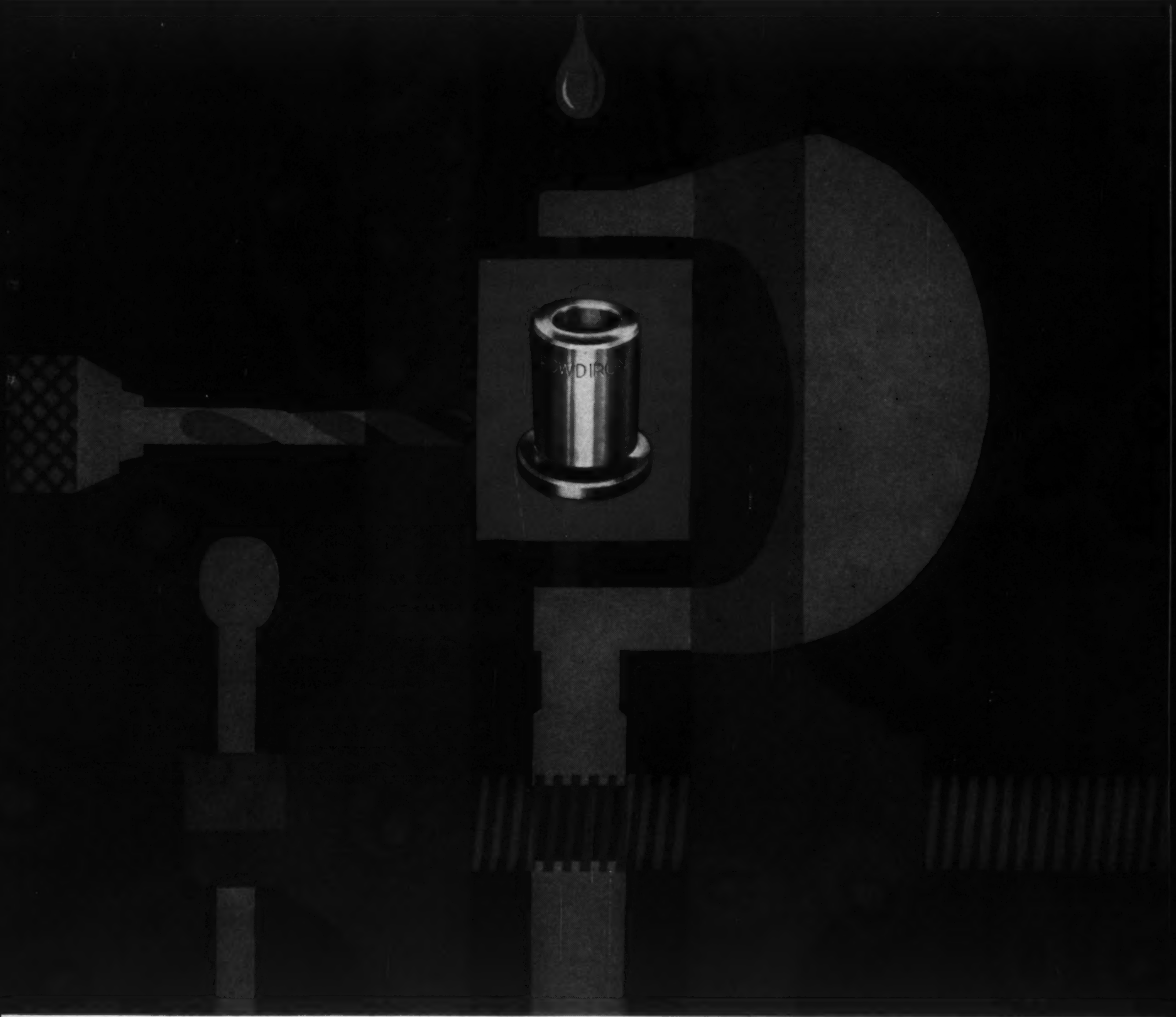
Granite City Steel Co.—D. P. Cairns, named plant engineer, blast furnace dept.

(Continued on P. 146)

W. C. French, Jr., appointed vice president, sales, National Tube Div., United States Steel Corp.

A. J. Elbert, Jr., named general manager, sales, National Tube Div., United States Steel Corp.

J. E. Ellis, named vice president, sales, Steel Warehouse Div., Jones & Laughlin Steel Corp.



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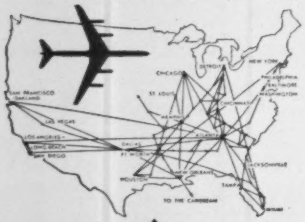

DELTA
the air line with the BIG JETS
GENERAL OFFICES: ATLANTA, GEORGIA

(Continued from P. 144)

Republic Steel Corp. — L. N. Dukelow, appointed asst. manager, sales, Tin Plate Div.; F. E. Gault, appointed asst. manager, sales, Pipe Div.; F. M. Keelan, named asst. superintendent, Blast Furnace Dept., Chicago District steel plant.

Westinghouse Electric Corp.—J. W. Pulaski, named manager, refrigerator and freezer cabinet section, engineering dept., Major Appliance Div.

American Can Co. — W. H. Mohr, appointed Kansas City plant manager, Canco Div.; Vere Wiesley, appointed asst. manager, manufacture, Eastern Area, Canco Div.

Etiwanda Steel Producers, Inc.—O. R. Timmons, named works manager.

Bausch & Lomb Inc.—Dr. L. S. Packer, appointed manager, Military Products Div.

Anaconda Wire & Cable Co.—A. H. Leader, named manager, sales, Orange and Redwood City, Calif. mills.

W. H. Jameson, appointed chief engineer, Fabricated Steel Construction Div., Bethlehem Steel Co.

Cooper-Bessemer Corp.—Robert Cizik, named executive asst., corporate development.

Kaiser Aluminum & Chemical Corp.—A. V. Lorch, appointed regional managing director, marketing, Kaiser Aluminum International in Europe and Africa.

STATEMENT REQUIRED BY THE ACT OF AUGUST 24, 1912, AS AMENDED BY THE ACTS OF MARCH 3, 1933, JULY 2, 1946, AND JUNE 11, 1960 (74 STAT. 208) SHOWING THE OWNERSHIP, MANAGEMENT AND CIRCULATION OF The IRON AGE, published weekly at Philadelphia, Pennsylvania, for October 1, 1961.

1. The names and addresses of the publisher, editor, managing editor, and business managers are: Publisher, George T. Hook, Chestnut & 56th Streets, Philadelphia 39, Pa.; Editor, George F. Sullivan, Chestnut & 56th Streets, Philadelphia 39, Pa.; Managing editor, Eugene C. Beaudet, Chestnut & 56th Streets, Philadelphia 39, Pa.; Business manager, None.

2. The owner is: Chilton Company, Chestnut & 56th Streets, Philadelphia 39, Pa.

Holders of more than 1 per cent of the capital stock outstanding of Chilton Company: Mary M. Acton, 260 Sycamore Avenue, Merion Station, Pa.; Mrs. Beulah Fahrendorf, Chateau LaFayette, Scarsdale, New York; Charlotte M. Gray, The Buchanan, 160 East 48th Street, New York 17, New York; Dorothy S. Johnson, Bankers Trust Co., 5th Ave. & 44th Street, New York, N. Y.; Kimberton Hills Farms, Inc., 1608 Walnut Street, Philadelphia, Pa.; Mabel P. Myrin, 1608 Walnut Street, Philadelphia, Pa.; Mary M. Acton, Surviving Trustee U/W/O Clarence A. Musselman, Dec'd, c/o R. F. Irwin, Jr., 2318 Packard Bldg., Philadelphia, Pa., Beneficiaries, Mary M. Acton and David Acton; J. Howard Pew, 1608 Walnut Street, Philadelphia, Pa.; J. N. Pew, Jr., 1608 Walnut Street, Philadelphia, Pa.; Mary Ethel Pew, 1608 Walnut Street, Philadelphia, Pa.; Alberta C. Sly, 415 East 52nd Street, New York 22, N. Y.; Alberta C. Sly, Executrix U/W/O Frederick S. Sly, Dec'd, 415 East 52nd Street, New York, New York, Beneficiaries, Albert C. Sly, Alberta C. Sly, and John E. Sly; Soleil Farms, Inc., 1608 Walnut Street, Philadelphia, Pa.; Steere & Company, c/o Girard Trust Corn Exchange Bank, Philadelphia 2, Pa.

3. The known bondholders, mortgagees, and other security holders owning or holding 1 percent or more of total amount of bonds, mortgages, or other securities are: None.

4. Paragraphs 2 and 3 include, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting; also the statements in the two paragraphs show the affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner.

5. The average number of copies of each issue of this publication sold or distributed, through the mails or otherwise, to paid subscribers during the 12 months preceding the date shown above was: 33,446.

GEORGE T. HOOK, Publisher

Sworn to and subscribed before me this 26th day of September, 1961.

PHILIP J. SHIRE, JR.

(My commission expires January 7, 1963)

[Seal]

Wagner Electric Corp. — P. F. Ryan, appointed manager, St. Louis sales office, and H. P. Pillisch, named manager, Indianapolis office, Electrical Apparatus Div.

Wilbur & Williams Co., Inc.— T. A. Durkee, named sales manager.

Chase Brass & Copper Co.—T. E. Anding, named manager, Chase Metal Service Div., Dallas.

Cohu Electronics, Inc. — J. L. Kimball, named asst. chief engineer, Kin Tel Div.

J. P. Lynn, appointed general manager, Industrial Products Div., American Welding & Manufacturing Co.

Link-Belt Co.—L. J. Carson, appointed director, engineering, headquarters in Chicago; R. S. Galloway, appointed general manager, Colmar plant; J. M. Shepard, Jr., appointed general manager, Atlanta plant and Southeastern Div.

Pittsburgh Plate Glass Co.—O. W. Andrews, appointed director, marketing services, Chemical Div.; Dr. H. A. Vogel, appointed manager, consumer products development, Paint & Brush Div.; Dr. P. G. Boermans, appointed manager, trade sales technical service, Paint & Brush Div., R. P. Ericson, appointed manager, industrial coatings development.

Black and Decker Manufacturing Co. — A. S. Boehm, named sales manager, Industrial - Automotive Div.

comparative tests prove Wheelabrator steel abrasive costs less

Typical test based on use of S-550 Shot, .017" Removal Size, 20 H.P. Motor, Nominal Abrasive Loss	Consumption Lbs. Per Hour	Cost Per Wheel Hour
WHEELABRATOR STEEL SHOT	7.4	70¢
STEEL A	9.9	89¢
STEEL C	8.55	79¢
STEEL D	9.25	81¢
STEEL R	10.7	91¢
MALL. G	13.5	$1.01
MALL. P	18.5	$1.20

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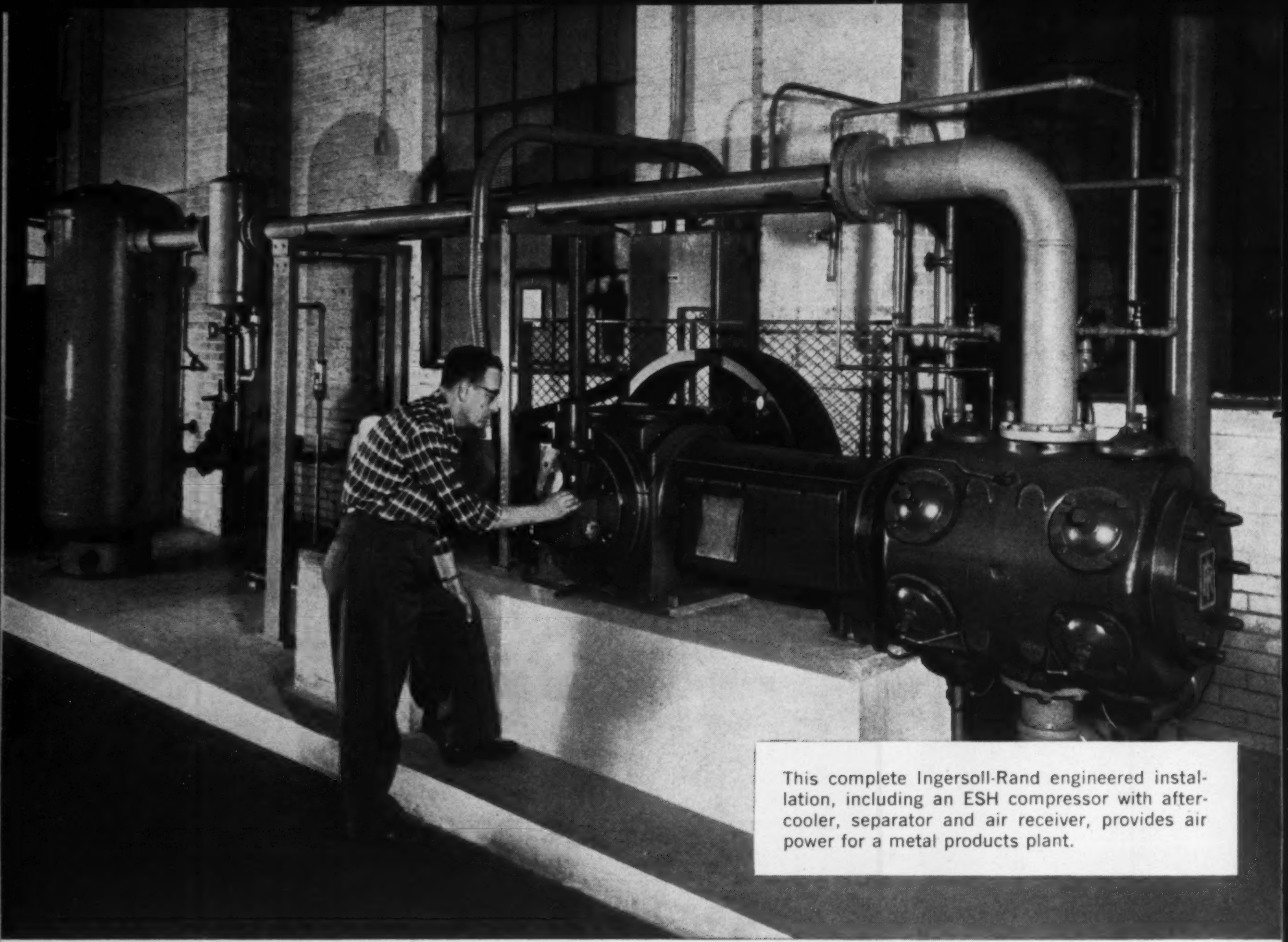

This complete Ingersoll-Rand engineered installation, including an ESH compressor with aftercooler, separator and air receiver, provides air power for a metal products plant.

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TIME TELLS THE DIFFERENCE

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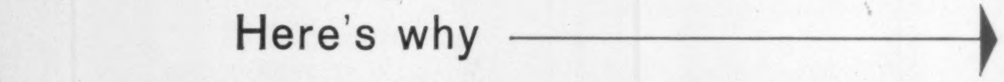
"No bearing wear in 60,000 hours"..."43,680 hours with no valve maintenance required"..."63,648 hours with no forced maintenance"..."13 years without even *cleaning* the valves". That's what our customers have been telling us, and there are many more true case histories like them which prove the *long-range economy* of Ingersoll-Rand compressors.

The *extra value* that's built into every type of Ingersoll-Rand compressor pays off with reduced maintenance and attention over many years of operation, and the result is big savings in the cost of your air power. Ingersoll-Rand offers also the *most complete* line of compressors, in reciprocating, centrifugal, axial-flow, rotary and thermal types. There are units from ½ to 25,000 hp, for pressures from one micron to 125,000 psi. Call your I-R man today for help on your job.



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20 to 150 hp	75 and 100 hp	125 to 350 hp	400 to 2000 hp	200 to 4000 hp	(steam-driven) 200 to 1500 hp

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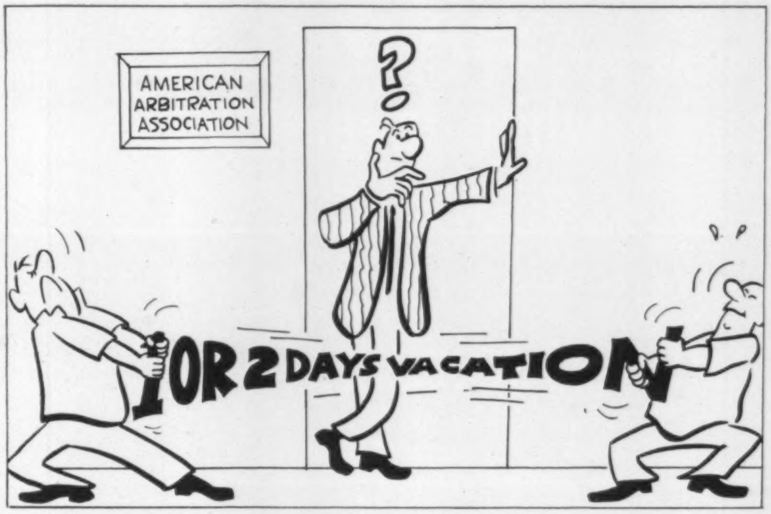


Stretching a Point

■ Under the vacation provisions of a contract in a vending-machine manufacturing plant, employees were entitled to a day of vacation for every month during the previous year in which they worked "at least one day." This was clear enough until one June 30 when the company recalled Walter M. who had been on layoff since the middle of May. He started work on the night shift, beginning at 10:30 p.m. and extending on into July 1.

How Much is a Day?—When the time came to figure his vacation pay, Walter argued that he was entitled to credit for June and July, since he had done some work in both months. Management didn't see it that way at all. "Your shift happened to cover just an hour and a half in June, but six and a half hours in July," the personnel manager pointed out. "So you get credit for July, but not for June."

The union admitted that the vacation clause was ambiguous, but didn't see why the ambiguity had to be resolved in the company's favor. So the matter eventually went to arbitration under the Rules of the American Arbitration Assn. How would you rule?

The Arbitrator Ruled:

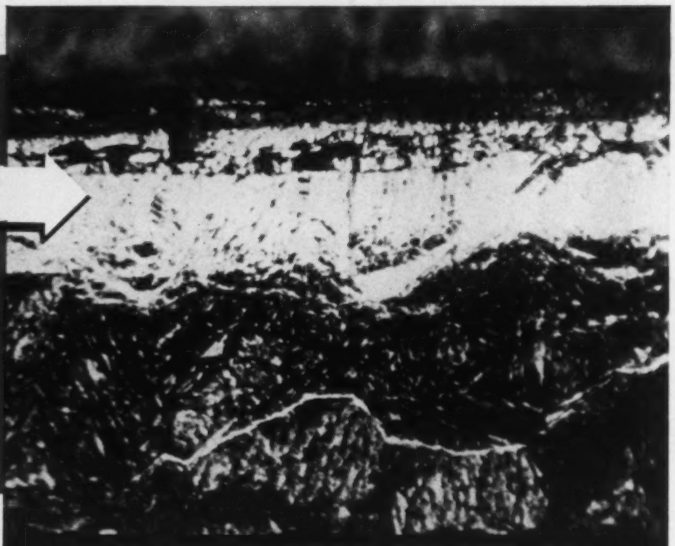
The main issue here, he said, was whether work for "at least one day" meant "at least one **full** day" or **"some** work on at least one day." "Let's look at the purpose of the clause as a whole. Obviously, it was intended to provide a way of calculating credit for a year's employment," he stated, upholding the company's view. "To rule otherwise," he said, "would mean in effect that eight hours is two days. My conclusion that Walter can only claim his service in one month is logical and in harmony with the obvious purpose of the clause."

From the files of
The American Arbitration Association

"You Arbitrate It!" appears in the second issue of The IRON AGE each month. Look for in in the November 9, issue.

CAUTION: The award in this case is not necessarily an indication of how arbitrators might rule in apparently similar disputes. Each case is decided on the basis of the particular history, contract, testimony and other facts involved. Some of these essential details may have been omitted in condensing the original arbitration for brief presentation.

REMOVE white layer FROM NITRIDED PARTS without grinding



WHITE LAYER ON NITRIDED STEEL PART — 500X

No longer is it necessary to grind the white layer off nitrided parts — gears, bearings, etc.

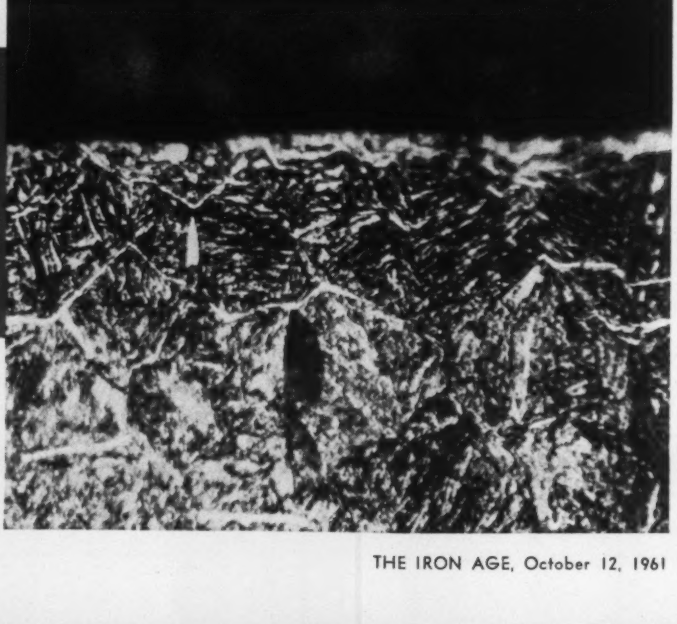
Now you can get rid of this blemish much more economically and without jeopardizing critical surfaces by grinding.

Your answer is BAN-WITE, a new metallurgical process (Pat. 2,960,421) developed by Red Ring Research.

This not only removes the objectionable white layer but it also tends to deepen the nitrided case. The danger of grinding checks is completely avoided.

Send your nitrided parts to us for treatment or, if you prefer, we will license you to use the process in your own plant. Either way, you save money and avoid rejects. Contact our local representative to get your jobs started now.

SAME PART AFTER BAN-WITE TREATMENT — 500X



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Honeycomb Seen As Key

Each pound of dead weight in the upper stages of a rocket may require as much as 1000 lb additional weight in the lower stages. Designers think 'sandwich' honeycomb has a lot to offer solid-fuel rocket cases. The material has a very high strength-to-weight ratio. It derives its strength from the stabilizing effect or support that the surface materials receive from the core. Feasibility studies are underway.

Rolls Wide Mo/W Sheet

A $15 million hot-rolling mill will soon be turing out wide sheets of tungsten and molybdenum at GE's Cleveland plant. The sheet is in demand for solid fuel rocket casings. The specially-designed mill will roll sheet widths to 24 in., with lengths to 25 ft. Thicknesses will range from 0.5-0.15 in. A second unit, already being planned, will produce thickness down to 0.005 in.

Air Force Pays Incentives

Viewed with great interest by electronics producers, a recent Air Force proposal allows tor larger profits. Providing, of course, the companies come up with a better way to cut costs on military contracts. The policy would allow rewards for good showings with corresponding penalties when a poor job is done.

Giant Press Packs Wallop

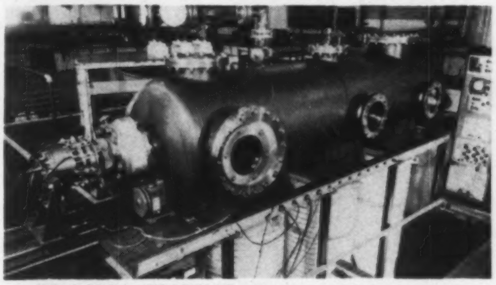
More use of refractory metals in airframe production has resulted in the development of an 8000-ton capacity mechanical-forging press. Reported to be the largest in the world, the press will also provide die designers more latitude in handling super alloys to come. The press will forge a 200 sq. in. slab of tough metal. The unit also offers precision. Some parts, such as the airfoils on blades, will be forged to size.

Uranium Slugs Get Jackets

For some reason, the Atomic Energy Commission wants molybdenum jackets on uranium fuel slugs. These jackets are made by coating the entire exterior surface of a cylindrical mold with molybdenum. The molybdenum, in turn, receives a 0.5-mil nickel coating. Next, the mold is chilled. Then molten uranium at 1200°-1400°C pours into the mold. An inert atmosphere is maintained during pouring and cooling periods.

REPPAC III Sets Record

A repetitively pulsed plasma propulsion engine ran a simulated one-year space mission. Scientists believe this is a record for this type device. To duplicate space conditions, the engine was run in a 13-ft vacuum chamber. A pressure of 5 x 10^{-6} mm of mercury was held in the chamber so that no interaction would occur between the plasma exhaust and residual chamber gas.



PLASMA ENGINE: Performs in vacuum.

Why Chance Duplication?

A Senate subcommittee is calling for a centralized government program to keep tabs on new technical developments. A central office would publish lists of scientific experiments in all federal agencies, the subcommittee insists. There's a tremendous volume of valuable information floating around. What's needed is a running inventory of what we've got.

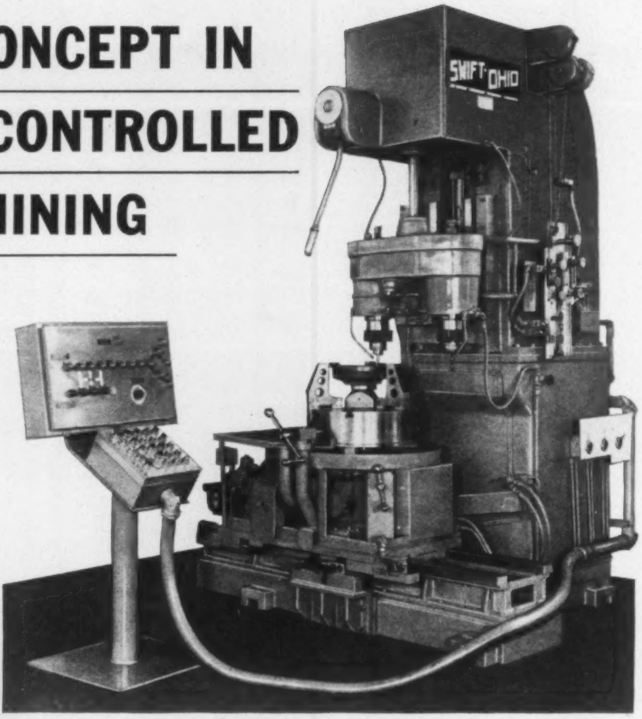
Locomotion on the Moon

What type of vehicle will operate best on the moon? Scientists at General Motors Corp. are working toward the answer. By testing various soils under vacuum, they can predict the character of the lunar surface and how it affects locomotion. Special instruments test density, friction and cohesion of various soils. One unit called the Bevameter, measures load-sinkage.

SWIFT

A NEW CONCEPT IN PROGRAM CONTROLLED MACHINING

Automatic or Manual Drilling, Tapping, Counter-Boring, and Positioning...with Swift Ohio's New, Simplified Positioning BLOX© System



New Swift Ohio 413-H Upright Heavy Duty Drilling and Tapping Machine with 24" diameter selective index table, hydraulic feed to spindle, 9 quick change spindle speeds, 190 to 1800 RPM, combined fine and coarse stepless feed range with surge control. This unit has optional double spindle and enables complete part setup change time of less than 10 minutes on various parts of like configuration having a range of 2" to 14" bolt circle, 1½" drill capacity.

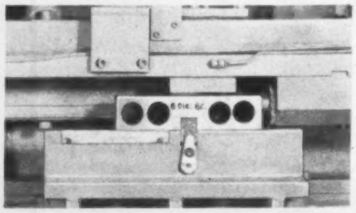
NOW FASTER, SIMPLER MACHINE SETUP

SWIFT OHIO's new concept in controlled programming offers greater versatility and usefulness of the machine by use of any type electrical automatic cycling operation, with complete unit positioning—or optional selective manual positioning!

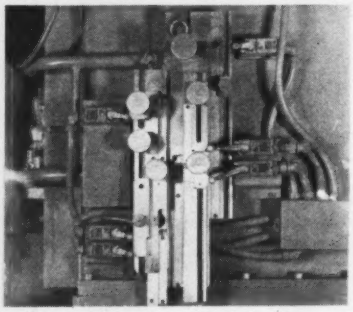
Machine setup is simplified through the new positioning "BLOX" system used in conjunction with direct reading scales and adjustable cams. This new Swift Ohio programming method, with selective push button controlled rotary Index Table, and multiple spindle drilling machine, provides fast and simplified machine setup on any bolt circle of like configuration. Swift Ohio "BLOX" programming eliminates need for many jigs and fixtures for normal drilling, tapping and counter-boring operations.

This versatility broadens the practical and profitable use of this machine to include job shop, maintenance department, and limited production plant operations—in fact, for any application where predetermined positioning on limited production items has been cost and time handicapped by need for extensive setup, jigs, fixtures, and large inventory storage!

Typical positioning "BLOX" with support and locating housing used in conjunction with selective control for locating any bolt circle, provides quick setup for like configuration work pieces.



Typical direct reading feed cam dogs, with adjustable slides and limit switch assembly, enable easy and quick setup procedure for depth control positioning.



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SINCE 1887—MULTIPLE-OPERATION EQUIPMENT FOR WELDING, MACHINING, ASSEMBLY, SPECIAL MACHINERY

Fourth of an IRON AGE Series on

Metalworking's Technological Explosion

Forming

The shape of things to come depends to no small extent on new ways to form metals. Here are some trends for the future.

By C.L. Kobrin
Metallurgical Editor

Technician readies stainless steel ingot for forging studies at General Electric Research Lab.

High-strength materials, chipless forming, large one-piece components—these are the forces shaping new trends in metalworking.

To meet these challenges, standard forming techniques are being refined; advances are being made in tooling and equipment; new forming techniques are being developed. Forming technology can best be described as explosive—both figuratively and literally.

No other forming techniques have so captured the imagination of metalworking as have explosive forming and other high-energy-rate methods: Magnetic, gas, and condenser-discharge forming.

Though still in their infancy, these techniques have chalked up impressive achievements in forming those high-strength, space-age metals which defy standard fabrication techniques.

Take explosive forming. This technique uses the energy of an explosion to force sheet metal into a die. Unlike standard forming techniques, springback is no problem. Nose cones, rocket nozzles, fuel tanks and pressure vessels are just a few of the shapes that explosive forming makes to the tight tolerances that aircraft and missile makers insist upon.

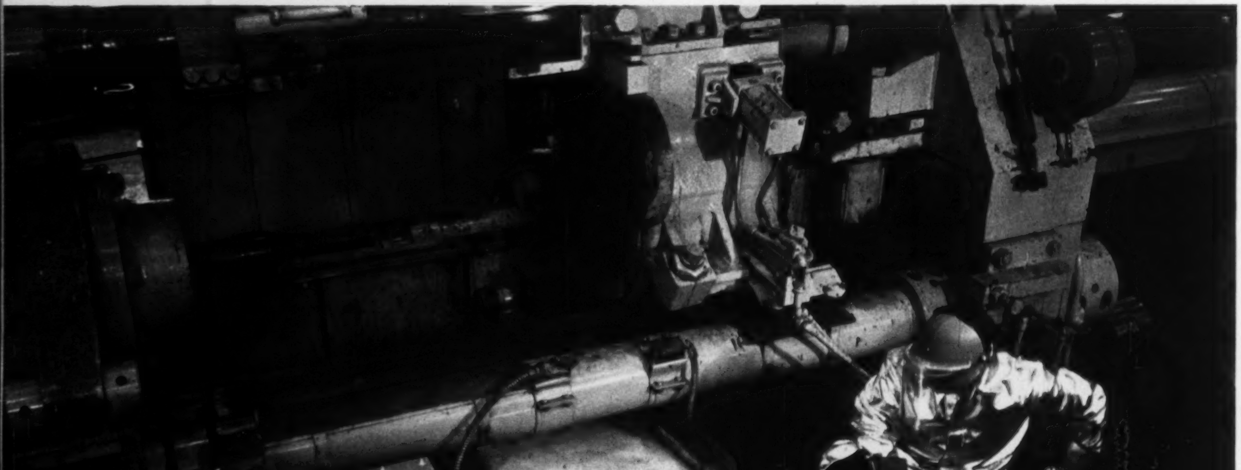
Key to its success is the tremendous force—up to 2,000,000 psi—exerted in just a few milliseconds. At such high strain rates, metals behave in a strange way; they withstand stresses much higher than theoretical. And mechanical properties are often improved over those obtained with standard forming techniques.

Even though there's little capital investment in equipment, explosively-formed parts still cannot compete in costs with small mass-produced parts. Whether the closer tolerances and improved mechanical properties are worth the added expense must be decided on a job-to-job basis. The noise of the explosion must be taken into account. It limits activities to remote sites.

"Thus, most applications for explosive forming will continue to be for large parts, short runs, strict tolerances or parts that would normally take several forming steps," says Vasil Philipchuk, manager, special projects, National Northern Div., Atlantic Research Co.

"Activity will center in aircraft and missile industries," adds Mr. Philipchuk. "However, explosive forming will be used for a wide variety of jobs ranging from plow shares to composite tubing."

Other high-energy-rate techniques have much the same



Research activities on hot extrusion, as in this General Electric lab, will concentrate on making forming more precise.

advantages as explosive forming. Unlike explosive forming, however, they will be generally used to make smaller parts in larger lots.

Discharging the energy, stored in a condenser, produces a shock wave which forms metal. Known by several names such as hydroelectric forming, Hy-Vo-Pac, Spark Bomb, the technique is used for die forming, drawing or tube bulging. Like explosive forming, work is usually formed underwater. The process stands a good chance of developing into a mass production tool.

Sudden forming or collapsing of a high-intensity magnetic field around a part also provides sufficient force for metalworking. Most applications for magnetic forming will take advantage of its particular feature—that of being able to form tubular parts without contacting a tool or die. Thus, it will be mainly used for swaging, sizing or bulging of tubing and fittings.

Zone refining produces ultrapure metals for forming studies at Olin Metals Research Lab.

Quartz lamps provide heat up to 1000°F to aid processing of tungsten sheet at Republic Aviation.

Gas forming, by such units as Convair's DynaPak, depends on the energy resulting from the sudden release of trapped, compressed gas.

Though not as powerful as explosive forming, DynaPak concentrates its energy into an ultrafast punch. By controlling this punch, small forgings and extrusions can be made to close tolerances. Turbine engine parts are one example.

In the future, gas forming may enlarge its scope to include parts the size of railroad-car wheels. Product quality will be somewhere between a forging and a semifinished part—one which requires little machining. Ideally, it would have the accuracy of a precision casting.

In time, the production rate will speed up. The first target: 10-15 strokes per minute.

Compared to the fast punch of high-energy-rate forming, cold extrusion might be termed a slow squeeze. Nonetheless, it is a high-volume operation, and capable of extreme precision. Metal recoveries are high. Little or no finish machining or grinding is required. These are vital points in view of the demand "to eliminate the chips."

Within the last ten years, demand for cold-extruded steel parts has climbed at an ever-increasing rate. And the upward trend is expected to continue as more and more fabricators discover the potential of cold extrusion as a chipless method for forming steel. One General Motors division, for example, is now extruding bearing cups, worm gears, and stepped shafts.

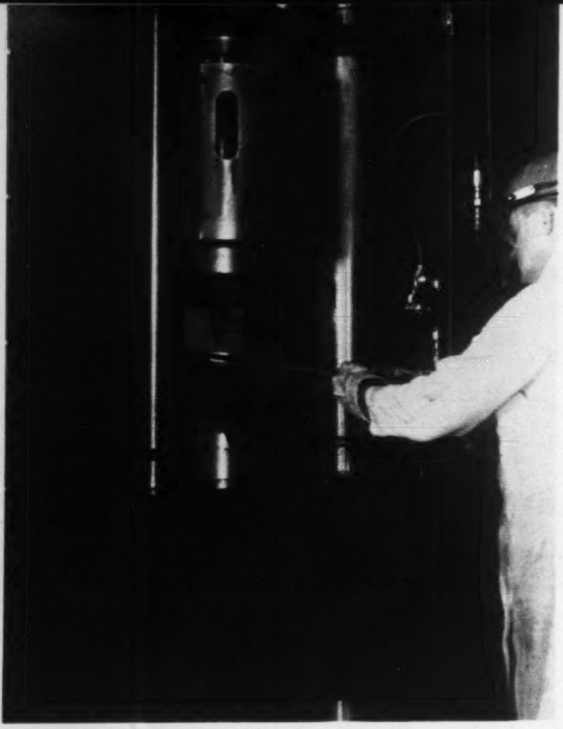
Behind this surge of activity lies years of frustration. Fabricators have long known how to cold-extrude aluminum, for example. But steel had always been a problem.

Developing new lubricants opened the way to new advances. Fabricators are learning how to extrude more shapes and sizes. All signs are that cold extrusion will be one of the most economical forming techniques for steel.

Cold extrusion has widened its horizons to include such metals as beryllium, titanium, columbium, tantalum, molybdenum.

Progress is already being made. P. G. Carbonaro, director, Rodman Lab., Watertown Arsenal, reports that thin-wall, large-diameter, titanium tubing is being extruded. Moreover, by ingenious die design, the tubing has an intricate cross-section which precludes a once-needed secondary forming step.

"This development points up the dominating influences played by the needs of the military in shaping forming technology," explains Mr. Carbonaro. The Army, for example, must have equipment with a high strength-to-



Ultrafast punch for making close tolerance forgings, by such machines as Convair's DynaPak, marks trend toward high-energy-rate forming.

weight ratio. The reasons: Maneuverability and transferability of weapons systems.

The problem of costs is more important than ever before. Thus, emphasis will be laid on developing those techniques, like extrusion and swaging, which provide thin, high-strength sections, and which require little finish machining.

For stainless and high-alloy steels, and other hard-to-form metals, most extrusion will continue to be done hot.

Back in the limelight again is the Ugine-Sejournet process. When this process uses a special glass composition as a lubricant, extrusion can be performed at temperatures (up to 4000°F) suitable for such metals as molybdenum and tungsten.

Process improvements made in the last twenty years also make glass extrusion of steels (including carbon steel) more economical. Longer lengths and more intricate shapes can be made.

Markets in the U. S. are just beginning to develop for glass-extruded steel. And in France, one of the largest steel mills will reportedly make seamless tubing directly from ingot.

"History shows certain patterns in metalworking," points out J. B. Seastone, manager, metals research laboratories, Olin Mathieson Chemical Corp. "For example, take stretch forming and shear spinning.

"These techniques were developed to meet certain specialized needs. But as the technology grows and equipment develops, they are gradually becoming more widespread."

Contour and radial-draw forming (stretch forming) which came into prominence within the last ten years are already broadening their sights.

Behind this move is a new trend in design. More and more designs are calling for large one-piece sections (that is, with no welds, or rivets) and with intricate contours. Contour and radial-draw forming are two techniques that will be used to a greater extent—particularly if the metal is hard to form by conventional means.

Many applications for these modern forming techniques will concentrate in the aerospace industries. However, nonmilitary uses, ranging from automobile bumpers to escalator sections, will continue to expand. The surface has just been scratched.

Just what is contour forming? Simply stated, it's a combination stretching-and-forming operation. While a sheet of metal is stretched over a die, a forming tool "irons" the metal—forming only a small portion at a time rather than a whole section. Radial-draw forming is a more versatile variation of contour forming.

With these techniques, a great variety of curves and irregular cross-sections can be formed in sheet or strip. And because the metal is carefully stretched just beyond

Left: Hot forming of titanium alloy at Republic Aviation obviates need of secondary stress-relieving step.

Right: Key to hot (1900°F) forming of tungsten at Republic Aviation is ceramic matched dies.

its yield point during forming, there is virtually no springback even after subsequent heat treatment.

There are other advantages. Tolerances are very close. There are no chips and little trim to be thrown away. And because certain metals harden during the forming operation, designers can use thinner, lightweight sections, as in the Atlas missile program.

Shear spinning is another highly accurate technique for forming sheet metal into contoured shapes. Whereas stretch forming is basically a tension process, shear forming is a compression process.

Starting with just a blank, thin-wall sections for rocket cases or stainless-steel pots and pans can be spun without intermediate annealing. There are no welds. Tolerances are very close.

Early successes with the Polaris missile were due to shear forming. By spinning thin-wall cylinders and joining them with girth welds, missile manufacturers came up with very strong rocket cases—far stronger than cases made of rolled sheet joined with a longitudinal weld. As an added dividend, the shear-spun case has no hot-rolled surface.

"The need for large, one-piece components must, of necessity, call for a new approach to fabrication," says J. B. Seastone.

"Otherwise, tools and furnaces, for example, would get prohibitively large. And sometimes, there would be excessive waste of material in finishing operations.

"One answer is explosive forming. Another may be to combine technologies. For example, one might make a casting or forging to the approximate size or shape. Then it can be given more dimensions or desirable properties, say by forming a section at a time."

"Another approach," adds H. N. Bogart, assistant director, manufacturing development, Ford Motor Co., "may be to make a rough forging or casting and build

Technician removes steel ingot from vacuum furnace at Ford Motor Co.'s Scientific Lab as first step in Ausforming.

Reducing atmosphere protects reactive zirconium alloy when heating billet prior to rolling at Olin Metals Research Lab.

BELOW: Mill operator must carry own oxygen supply when forming refractory metals in Universal-Cyclops' argon-filled InFab room.

up to the finish size by depositing metal in the key areas."

Electroforming, or electrodepositing, is one technique whereby this can be done. In fact, for making some radar wave guides it is standard practice. Cast pieces serve as the wave-guide ends. Electroforming then finishes the job.

Other advantages of electroforming? Ultrafine precision including internal dimensions; high-quality surface finish; simple and low-cost tooling; ability to deposit alloys in multilayers if so desired.

Currently, most electroforming is of nickel and copper alloys. However, a new aluminum-plating technique may open up new possibilities.

Plasma-jet spraying is another technique for fabricating shapes by deposition materials rather than squeezing,

High-volume production and close tolerances keynote rising demand for cold-extruded steel parts (Verson Allsteel).

bending, or otherwise forming them.

Key to the process is a special gun which melts, shoots and deposits particles of materials such as tungsten, molybdenum and zirconia on a specially-sized mandrel.

Greatest effort to date has centered on tungsten for nozzles and nose cones. However, applications for arc spraying include many industries. Potential is enormous, experts say, for using these coatings as corrosion barriers and thermal radiation shields.

"Hot forming" and "cold forming" have adequately described forming techniques in the past. Now one also hears of "high-temperature forming" and "ultracold forming."

Refractory metals, because of their high recrystallization temperatures, must be formed in temperature ranges in which fabricators have had little experience.

The problem becomes particularly acute when rolling or extruding finished products. Some of these metals oxidize readily at high temperatures.

One solution is to first "can" the metal. After forming, the can is dissolved off. Another technique is to heat the metal in a vacuum and then quickly form it.

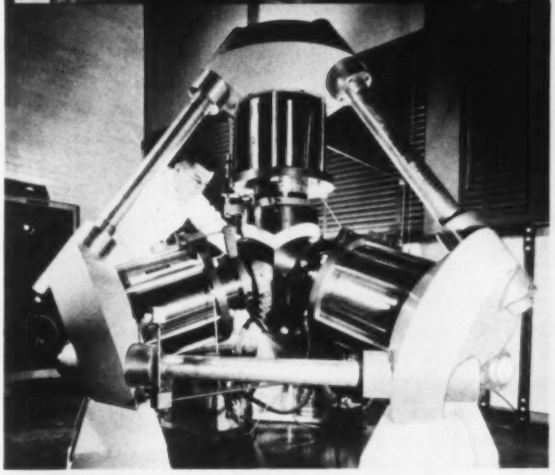
Another approach is to form the metal in a room in which air has been displaced by argon. There, fabrication proceeds without the danger of oxidation. Universal-Cyclops' InFab room is a good example. Next to be developed will be a vacuum room.

"The next step in the future of forming," suggests E. C. Bishop, materials manufacturing department, Westinghouse Electric Corp., "will be to build machinery which incorporates its own atmosphere or vacuum chamber in which the metal can be formed."

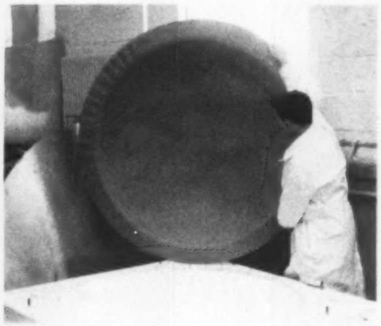
"What may well be the final answer," comments G. A. Timmons, vice president, Climax Molybdenum Co. of Mich., "is to develop new forming techniques specifically for the refractory and other hard-to-form metals.

"One method may be to slit and flatten a shear-spun cylinder. The resulting sheet would have very tight tolerances."

"Ultracold temperatures—fabricators are learning that they can be an aid to metalworking," says R. M. Gustafson, metallurgist, in charge of fabrication processes, Bureau of Naval Weapons.



Exploring effects of ultrahigh pressures and temperatures on metals is General Motors' tetrahedral anvil press.



Magnetic-forming technique was used to form aluminum missile-dome end at Republic Aviation.

Shear spinning, by machines like this Lodge & Shipley unit, will play vital role in new approach to making sheet metal.

The principle is well known. Working an austenitic stainless steel at ultracold temperatures strengthens it markedly. Ardeforming, a new forming process, does just that. Tensile strengths up to 260,000 psi in austenitic stainless steels have been demonstrated.

Developed mainly for rocket cases, the process is expected to be used for making pressure and storage vessels, and high-strength tubing.

Here's how it works. A preform and its die are cooled to ultralow temperatures by submerging in a tank of liquid nitrogen. A pressurizing line connects the preform to a supply of compressed nitrogen. When it's opened, the gaseous nitrogen expands the preform to fit the die.

This concept of simultaneous forming and strengthening may be the start of a trend.

Ausforming, the process which strengthens steels up to 500,000 psi, has potential in this area. Scientists at Ford Motor Co.'s Scientific Laboratory find that a metal shows much greater ductility during Ausforming at 1000°F than standard hot working at 1000°F.

"This same principle," adds E. D. Marande, associate director for applied research, Ford Motor Co. Scientific Laboratory, "can be applied to a number of forming operations such as drawing, forging, extruding, as well as rolling."

Forgers have also kept pace with the call for larger sections and less waste.

There have been several significant developments in recent years. Among them: Explosive forging, cored forging, and multiple-ram forging. Perhaps the most unique is impacting—forging in mid-air—in which two horizontally-driven dies simultaneously strike a forging blank.

Key features of the Chambersburg Engineering Co. impacter are lack of vibration (thus no heavy foundations are required), and that it lends itself to automatic operation.

Another major development has been the Air Force's heavy-press program. Before these presses were built, a 10,000-ton press was considered to be large. Two of the new presses have capacities up to 50,000 tons. Yet, precision has been greatly improved.

Though developed mainly for the aircraft industry, heavy presses are being considered for other markets. The automotive industry with its mass produced parts of aluminum and magnesium seems a likely prospect.

These very large presses were designed for applying force to large areas. The force per unit area, or pressure, is relatively small. Two special devices, the "belt" and "girdle," were designed for applying a large force to a very small area while sustaining temperatures up to 6500° F.

These were intended primarily for studying various reactions, transformations and physical properties at pressures up to 1,500,000 psi. They are not adapted for forming metals.

One result: General Electric Co.'s man-made diamonds. Another: Borazon, a diamond-hard substance which is stable at 3500°F.

"In order to form metals with such devices, they would have to be considerably modified. Only very small pieces could be handled," says GE's H. M. Strong. But they will provide some basic information as to the effect of ultrahigh pressure on materials, and what makes them hard.

"Another major problem," adds J. B. Seastone, "is a way to measure that intangible quality—the appearance of a finished product. When appearance can be measured and correlated with fabrication techniques then a major step forward will have been made."

Such information is vital to the future of metalworking. And when the fundamentals of how and why metals deform and fracture, and the mysteries of surface effects are solved, then fabricators will be a lot closer to controlling the finished product starting with the ingot. This is the ultimate goal.

Metalworking's Technological Explosion

This article on Forming is the fourth in The IRON AGE's new series on "Metalworking's Technological Explosion." Forthcoming articles will cover other advanced processing methods in metalworking.

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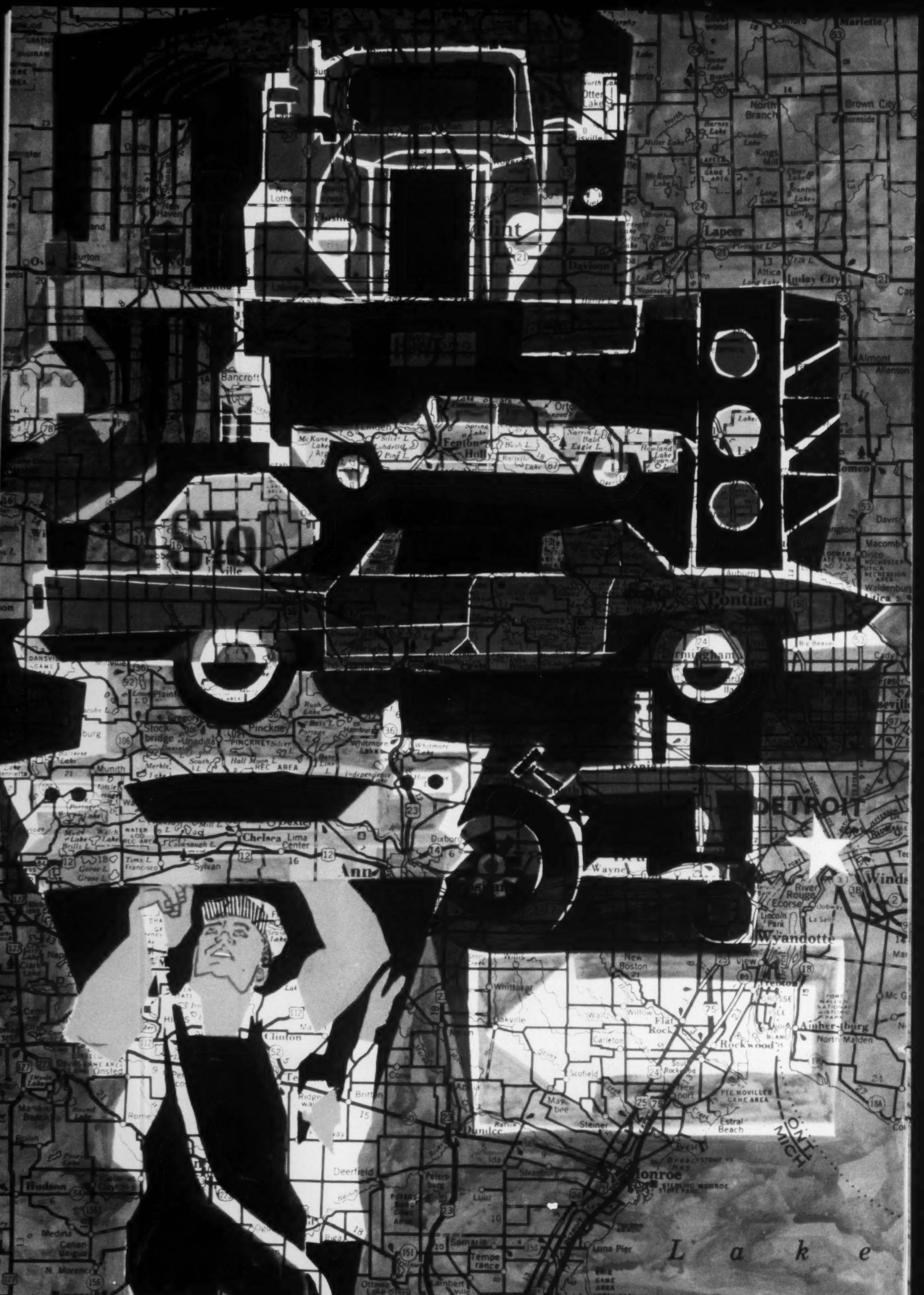
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Today, Detroit is not only a manufacturing giant —producing cars, machine tool accessories, foundry items, metal stampings, hardware, industrial chemicals, heavy handling equipment, conveyors, drugs, paints and a host of commercial products . . . today Detroit is also a center of learning and of beauty.

Its dramatic Civic Center covers 78 acres of waterfront. Its schools like Wayne State University and Cranbrook; its Art Institute; its General Motors Technical Center housing more than 4,000 scientists; its Belle Isle Park, Greenfield Village with its marvelous Ford Museum—all are known everywhere in America.

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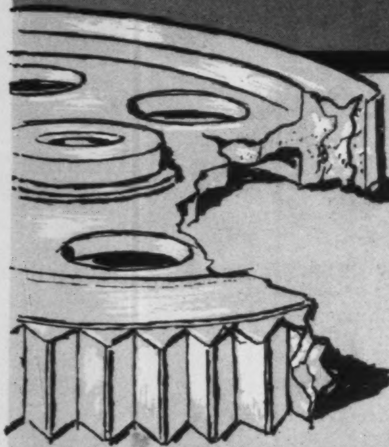

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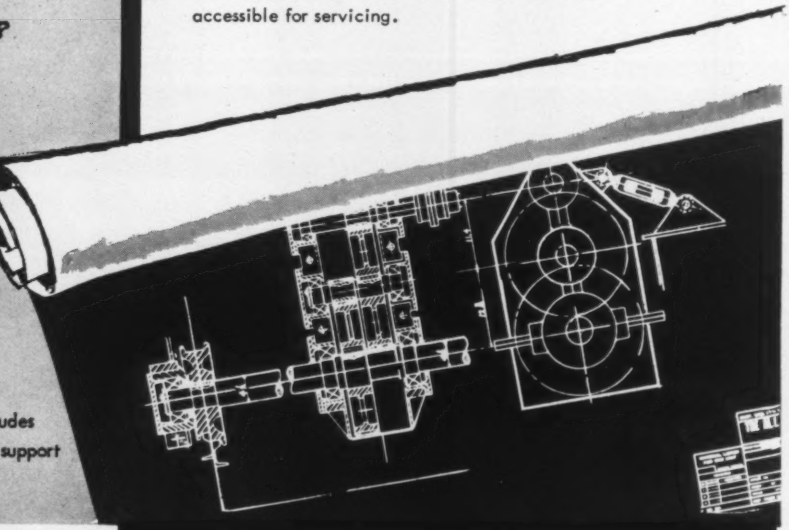

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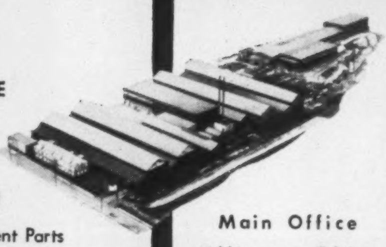

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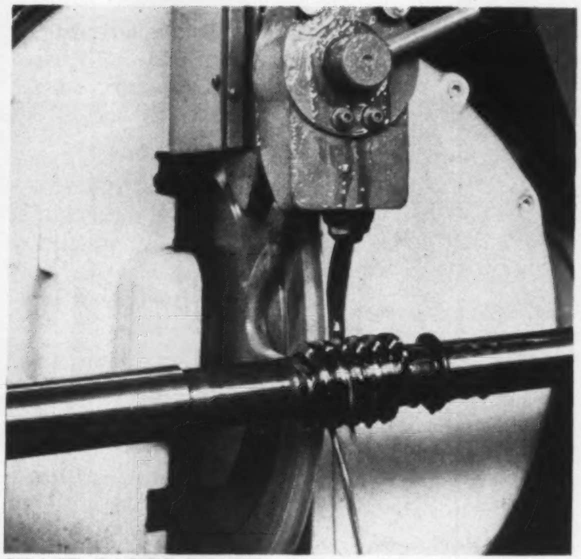


SHAFT TAKES SHAPE: Abrasive wheel transforms solid bar into a precision worm with a good finish.

FORMS CHIPS: As the chips illustrate, abrasive machining is actually a chip-forming process.

Abrasives Slash Cutting Costs

Abrasives are one of man's earliest tools. But some men still think they're limited to precision finishing work.

With modern grinders, abrasives really pay off on heavy metal-removal operations.

▪ Is your shop wasting money by over-machining? Are excessive stock allowances, caused by hard outer scale, increasing your piece-part costs? If so, perhaps you should check out abrasive machining.

Not too long ago, heavy stock-removal operations were reserved for cutter-type machine tools. Now, however, high-powered surface grinders offer a challenge to these conventional machining methods.

Check Profit Areas — Abrasive machining—removing up to ¼ in. of metal with a grinder—slashes costs in several different areas. Set-up time tumbles. Machining time and operator expenses dip drastically. Overall operating costs are also greatly reduced.

Other benefits include lower tooling costs and a more reliable end product. Do you know the real cost of grinding wheels is lower than the final cost of cutting tools?

Surface grinders give you more productive minutes out of every hour than most cutter-type tools. This is the word from spokesmen at the Mattison Machine Works, Rockford, Ill. Abrasive experts at the Norton Co., Worcester, Mass., back up this claim.

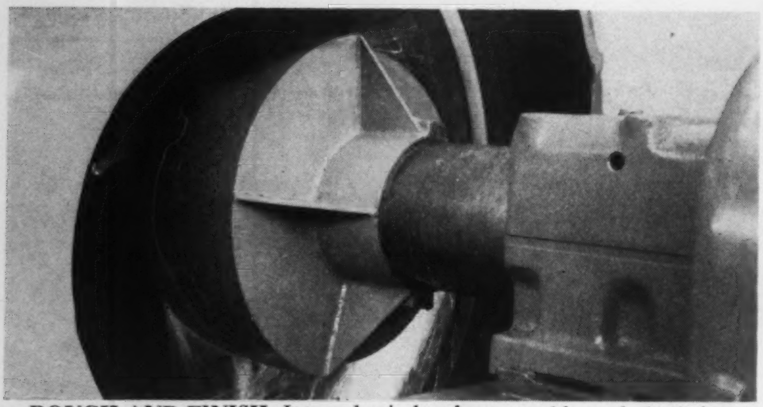
Plan Ahead—Both companies report that surface grinding, even on stock-removal operations, should be compared on a fixed-cost basis with other methods of flat machining. This should be done before a part design is finalized and released to the shop.

Too often, decisions which affect the cost of flat machining are handled loosely, right on the shop floor. Many shop men think of grinding as a limited metalworking process. These fellows should consider some of the latest advances in grinding technology.

The old criteria for grinding are no longer the only factors which must be weighed. These old standards center on material hardness, accuracy requirements and finish demands. All three still apply.

Production Pays Off—Productivity is even more of a key word in modern grinding applications. Add to a surface grinder's high output some other vital factors.

In making a grinding decision, there are four opportunities for profit improvements. The first potential profit area hinges on the cost of the grinding wheels. They're a



ROUGH AND FINISH: Internal grinder shapes molds to desired size.

lot less expensive than standard- and special-geometry cutters.

To evaluate abrasive machining versus conventional machining, you should gage all four distinct elements. Each of these key factors must be figured on a cost-per-part basis. Don't use purchase-price data alone to pinpoint the true cost of replacing a wheel or cutting tool.

Keep Cutting—Here are the four cost factors which must be compared. How do set-up and change-over costs stack up? What about inventory expenses? Don't forget to include depreciation costs. Naturally, sharpening demands play another important role in making the final choice.

Let's see how abrasive machining proves out on each of the preceding cost factors. You can realize lower change-over and set-up costs by using self-dressing wheels. There's never any downtime on a surface grinder for replacing dull tools.

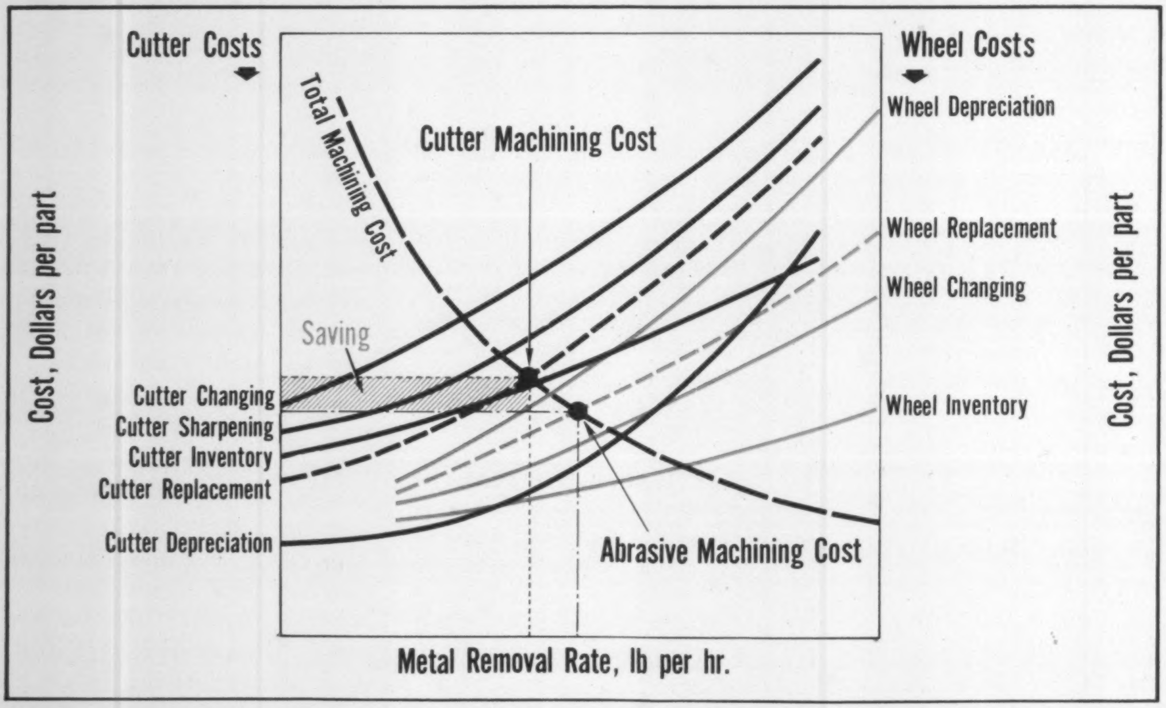
If you switch to grinding, broken-tool problems also become a thing of the past. Automatic sizing on a surface grinder compensates for the wheel's wear, with no manual adjustments.

No Wasted Efforts—This means there's no downtime consumed in setting the grinder or its wheel during most of a production run. Cutters, on the other hand, must be re-set after each sharpening cycle.

How do inventory costs compare? Again, grinding has the edge on cutting tools. Wheel life is predictable. Breakage is extremely rare. Thus, you don't have to stock extra wheels for breakage reasons. All that's needed is a small stock for replacing normally-worn wheels.

Wheels are standardized. There's less special geometry than with conventional cutting tools. A limited number of wheels fills a variety of needs. They also fit the demands of various piece-part sizes.

Check Abrasive vs. Standard-Cutter Costs



Abrasives Compete With Vertical Milling

	Vertical Mill	No. 400 Grinder	Net Savings
PRODUCTION RATE—Pieces Per Hour	5	8	
(1) **MACHINING COST Per Piece** Machining time x (labor + overhead) = (min) x ($ per min)	$0.75	$0.25	$0.50
(2) **TOOL OR WHEEL REPLACEMENT COST Per Piece**			
(a) Tool or wheel change cost	$0.01	$0.00	
(b) Tool or wheel depreciation cost	0.06	0.03	
(c) Tool or wheel sharpening cost	0.04	0.00	
	$0.11	$0.03	$0.08
(3) **NONPRODUCTIVE COST Per Piece**			
(a) Setup cost	$0.75	$0.19	
(b) Loading & unloading cost	0.75	0.69	
	$1.50	$ .88	$0.62
TOTAL MACHINING COST Per Piece = (1) + (2) + (3)	$2.36	$1.16	$1.20

Finish improves from 125 to 32 rms. Accuracy after grinding: ±0.001 inch; after milling: ±0.005 inch. Grinding flatness: 0.0002 TIR. Milled flatness: 0.002 TIR.

As stated, the third comparison factor is depreciation costs. The improved bonds on today's wheels insure economical abrasive wear at high production rates.

Controlled Wear—Wear is easily controlled. After several grinding variables are fixed, human judgments are minimized. Of course, to obtain optimum wheel life, you have to preset downfeeds and grinding fluids to match wheel specifications.

Cutter-wear problems are much more complex. Overdulling of tools often results from excessive metal-removal rates. Hard spots, tough outer scale and burned edges present hard-to-cure cutting problems.

Traditionally, grinders have been used to handle ultrahard metals. Even the hardest metals can be machined with special abrasive wheels. Heat-resistant aluminum-oxide and silicon-carbide wheels perform well. They also hold up under the toughest grinding conditions.

Dulling Problems—Dull cutters can throw a wrench into a tight working schedule. Grinding wheels, on the other hand, remain sharp as the abrasive wears away and exposes constantly-fresh cutting edges.

On surface grinders, wheels usually incorporate self-sharpening or automatic dressing. No other machine tools, or labor are needed to service a grinding wheel.

An important bonus that's inherent in abrasive-machining setups is fast loading and unloading. Magnetic chucks slash nonproductive grinding time while easing parts handling.

With a multiplicity of cutting points, grinding pressures remain constant. These pressures are always evenly distributed. There are no intermittent chip loads which tend to spring or shift the part. During the finish grind, there are no stresses. This improves the accuracy of finish-ground parts.

Hold Tight—With most grinding fixtures, little clamping pressure is needed. Many parts are ground in pot-type fixtures. Clamping requirements are almost nil because the wheel exerts a downward pressure on "potted" parts. There's never any lifting of the work away from the table.

Grinding reduces material costs, especially when castings are bought by the pound. There's no need to pad stock allowances or to baby the wheel because of scale.

A complete breakdown on the cost of grinding cast iron roll housings appears in table form. The same table lists milling costs on the same job. In both cases, stock removal was 0.15 in.

In shaping the cast iron housings, grinding provides a 160-pct production increase over milling.

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Order Copper by the Numbers

New System Classifies Brass- and Wrought-Copper Metals

Are you confused by the various trade names used to designate the copper alloys?

Numerical designations can clear up the old hodgepodge of hard-to-decipher misnomers.

- Brass or baseball, it's hard to tell who's on first without an accurate easy-to-read scorecard. The member companies of the Copper & Brass Research Assn. have no professional interest in baseball. But CABRA members are quite interested in the prompt and accurate identification of their brass- and wrought-copper metals.

To make such identifications easier, they've adopted a new system of numerical designations for copper and copper-alloy metals. A concise edition of this numbering code appears in table form.

The new system is logically centered around the word, "copper." Here's how it works. Three numbers, beginning with Copper No. 101, have been assigned to more than 100 commercially-important wrought coppers and copper alloys.

Room to Grow—Unassigned numbers have been left open in each general alloy category. This will allow other coppers and/or copper alloys to be added at a later date—as the newcomers prove to be of sufficient interest to users.

A numbering system permits quick reference. It's a lot more logical than some of the old trade names.

Of course, many of the old designations are rather quaint. However, they're also confusing. With the concise numerical designations, chemical compositions are easy to pin down. Thus a purchasing agent or a design engineer knows what he's dealing with.

What Is It?—Previously, he was left up in the air. Consider the term Jewelry Bronze. Is it a pure copper, a modified copper, a non-leaded copper-zinc alloy, or a copper-aluminum alloy? Does it contain tin? Actually, it's a copper alloy with 86-89 pct Cu, 0.05 pct Pb, 0.05 pct Fe and a trace of zinc.

Some of the older designations were even more of a problem. Have you ever heard the term Tombac? What about an equally-puzzling alloy known as Talmi Gold? Chances are they're both unknown, unless the history of copper-alloy names is among your hobbies.

These puzzlers are only two of the names given to hundreds of copper metals during the past 100 years.

Many of the old designations are even logically unsound. How many times has it been explained that Commercial Bronze is bronze in color—but it's chemically a brass? Why? Because it contains only copper and zinc.

Nickel Silver is another technical misnomer. This copper metal contains no silver. In fact, it isn't even silvery in appearance.

Standard Metals—About one-third of the numbered alloys in the new system are considered standards. Only these standards appear in the short table. Their properties and other useful data may be found in the CABRA manual of standards.

Information about the other numbered copper metals, classified by CABRA's Standards Committee, is available from the company or companies which supply them. On request, CABRA will furnish a complete alloy-classification list. You can also obtain the names of companies which supply a specific alloy by writing to the Copper & Brass Research Assn., New York City.

The new system uses the heading, "Copper No. . . ." to designate the coppers. "Copper-Alloy No. . . ."

EASY TO CODE: Accurately-measured coil lengths are easily identified by using the three-digit code. Customers should order by number.

pinpoints the various copper-base alloys. Most of the newly-numbered copper metals have previously-accepted trade names. It's expected that these names will fade into gradual disuse as users become more familiar with the new numbers.

Change the Name—After the new classification was drawn up by the Standards Committee, it was officially adopted by the copper industry. In harmony with the accent on copper, these companies will now be called copper mills rather than brass mills.

In addition to establishing a ready reference for wrought-copper metals, the new system offers other advantages. It does away with the classification problems that plagued the U. S. Customs Bureau and domestic truck and rail carriers. Also, the new numerical code provides a more coherent category of copper-alloy identification for the Defense Dept. and interested metalworking plants.

Along with clarifying nomenclature, numerical coding boasts another inherent advantage. It should fit right in the groove with mushrooming data-processing applications. Tape- and card-control media both thrive on numbers.

Follow Trend—Digital analyses are becoming more and more popular. Today, everyone wants to order by number. If it's easier to order lunch by the numbers, why not order copper alloys the same way?

Why was a three-digit system chosen? Because it doesn't conflict with the four-digit designations already in use for steel and aluminum. Thus, programmed stock orders won't be easily confused.

The precise numbering code also offers advertising and sales-promotion advantages. In every case, it concentrates on the simple terms, copper and copper-alloy, in lieu of the multifarious trade names that are confusing to almost everyone.

Universal adoption of the new coding system won't take place overnight. It will involve gradual changing of catalogs, price and spec sheets and similar literature.

Numbers Replace Confusion

Copper Number	Previously-accepted Trade Name
102	Oxygen-Free Copper
110	Electrolytic Tough-Pitch Copper
122	Phosphorus Deoxidized High Residual Phos. Copper

Copper Alloy Number	Previously-accepted Trade Name
210	Gilding, 95 pct
220	Commercial Bronze, 90 pct
226	Jewelry Bronze, 87.5 pct
230	Red Brass, 85 pct
240	Low Brass, 80 pct
260	Cartridge Brass, 70 pct
268	Yellow Brass, 66 pct (Sheet)
270	Yellow Brass, 65 pct (Rod and Wire)
280	Muntz Metal, 60 pct
314	Leaded Commercial Bronze
330	Low Leaded Brass (Tube)
332	High Leaded Brass (Tube)
335	Low Leaded Brass
340	Medium Leaded Brass, 64.5 pct.
342	High Leaded Brass, 64.5 pct.
353	High Leaded Brass, 62 pct
356	Extra High Leaded Brass
360	Free-Cutting Brass
365	Leaded Muntz Metal, Uninhibited
366	Leaded Muntz Metal, Arsenical
367	Leaded Muntz Metal, Antimonial
368	Leaded Muntz Metal, Phosphorized
370	Free-Cutting Muntz Metal
377	Forging Brass
385	Architectural Bronze
443	Admiralty, Arsenical
444	Admiralty, Antimonial
445	Admiralty, Phosphorized
464	Naval Brass
465	Naval Brass, Arsenical
466	Naval Brass, Antimonial
467	Naval Brass, Phosphorized
485	Naval Brass, High Leaded
502	Phosphor Bronze E
510	Phosphor Bronze A
521	Phosphor Bronze C
524	Phosphor Bronze D
544	Phosphor Bronze B-2
614	Aluminum Bronze D
651	Low Silicon Bronze B
655	High Silicon Bronze A
675	Manganese Bronze A
687	Aluminum Brass, Arsenical
706	Copper Nickel, 10 pct
715	Copper Nickel, 30 pct
745	Nickel Silver 65-10
752	Nickel Silver 65-18
754	Nickel Silver 65-15
757	Nickel Silver 65-12
770	Nickel Silver 55-18

Line Plates 2000 Pipes an Hour

A combination pipe mill is slated to begin full-scale operations by July of 1962.

But a galvanizing line at this plant proved so successful, it jumped the starting gun.

▪ One of the world's most modern electroplating lines has just started to earn its keep at the National Supply Div. of Armco Steel Corp., Ambridge, Pa.

With this new equipment, steel tubes are electro-galvanized at speeds up to 2000 pieces per hour. All operations are automatic. The thin-walled tubes are picked up at one end of the line. They emerge, tied in bundles, at the other end.

Clean and Dry—In the process, the tubes receive two cleanings and several rinses. Then, they're carried through the plating solution into a chromic-acid bath. After final rinsing, every tube is carefully dried.

Successive stages in the electroplating process include: Immersion in an alkaline cleaner; rinse; immersion in another special alkaline cleaner; rinse; immersion in the plating solution; then drip dry.

Next, the tubes are rinsed in chlorinated water. Then, they're immersed in chromic acid. After a chromic-acid neutralizing rinse, each tube gets a cold-water rinse.

A hot-water rinse is the next-to-last station in the line. Warm-air drying wraps things up.

Automatic Threaders—The new electroplating line also handles another big job at the Armco plant. It applies a second galvanizing coat to rigid steel conduits. In an earlier operation, these conduits are hot-dip galvanized and threaded. Before bundling, automatic threading machines attach couplings and thread protectors to the rigid conduits.

One of the prime features of the new line centers on the rinsing operations. All rinse water is chemically treated to insure absolute purity, before it's discharged into the sewer lines. Vents above the equipment carry off the fumes.

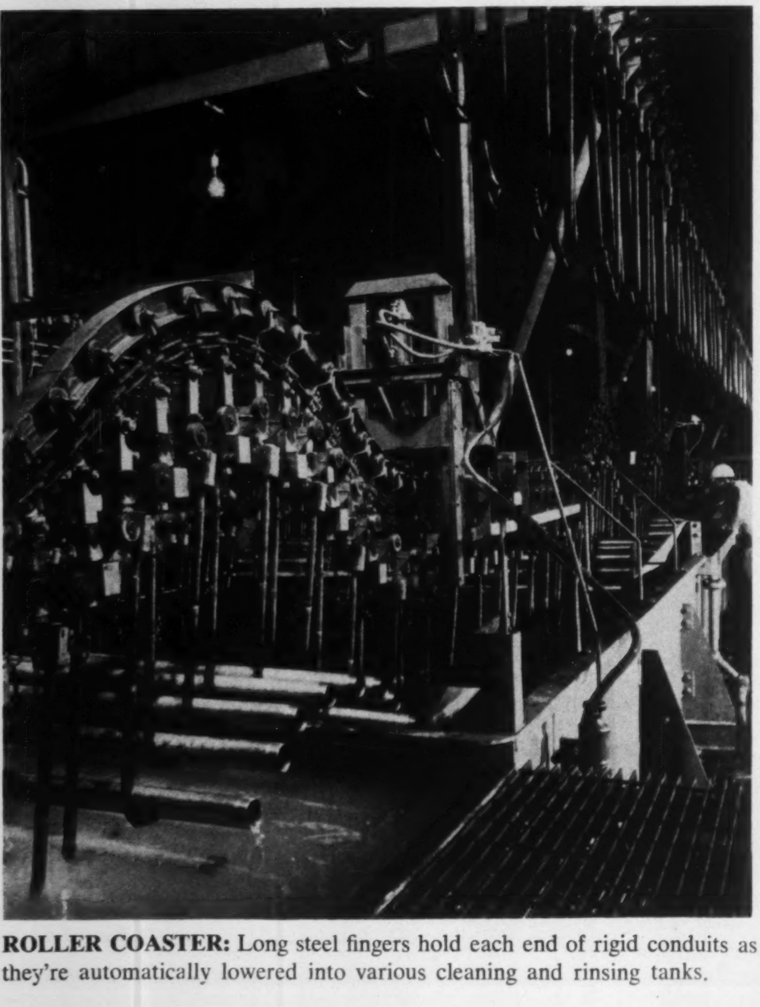
An electrical current of more than 50,000 amp circulates through the plating solution. Zinc anodes in baskets are used to deposit an increased amount of zinc coating on the threaded ends of the conduits.

Bans Rust—The chromic-acid bath deposits a film of chromate over the galvanized coatings. This produces an iridescent finish that helps to retard white rust.

Both the electrical metallic tubing and the rigid steel conduits pass through automatic printing and bundling equipment. A trade mark and the Underwriters Laboratories approval seal are imprinted on the tubes. The rigid conduit receives an imprinted trade name, Spang Blue Star conduit.

The conduit-finishing department was the first to go into production at National Supply's new multi-million dollar Ambridge plant. Other operations of this department include sawing the tubes to uniform 10-ft lengths, reaming and threading of the rigid conduit.

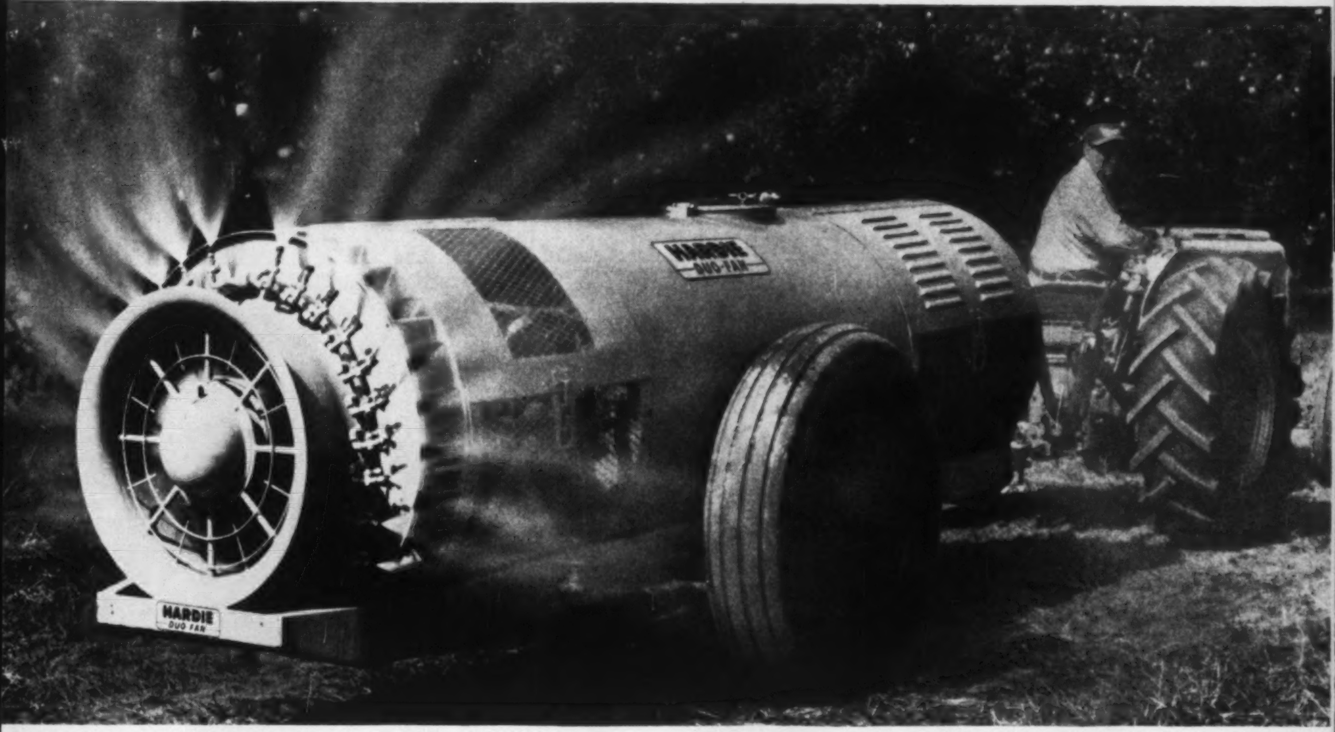
When the new combination pipe mill begins full-scale operations in July of 1962, it will also turn out continuous-weld and electric-resistance-weld steel piping.



ROLLER COASTER: Long steel fingers hold each end of rigid conduits as they're automatically lowered into various cleaning and rinsing tanks.

CHEMICAL SPRAYER TANKS—JUST ONE OF MANY APPLICATIONS FOR

Ingersoll STAINLESS-CLAD STEEL



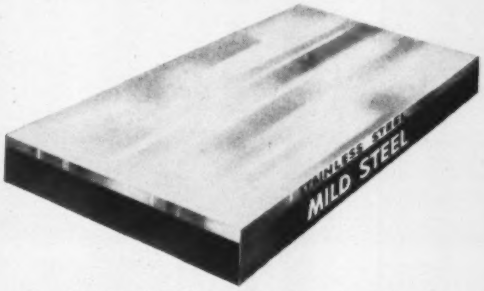
Ingersoll makes the steel—not the tanks

WHY PAY FOR SOLID STAINLESS *when you need corrosion resistance on one side only?*

USE IngAclad *single-clad stainless-clad steel*

HERE ARE THE FACTS:

1. IngAclad stainless-clad steel is priced approximately 28% less than solid stainless steel.
2. On the stainless side, IngAclad provides exactly the same corrosion resistance as solid stainless.
3. The stainless layer is inseparably bonded to the mild steel layer.
4. 20% of the total steel thickness is Ingersoll stainless steel.
5. The stainless layer can be any one of types 302, 304, 316, 321 or 347.



OTHER TYPICAL APPLICATIONS
Metal degreasers, food service equipment, cooking utensils, counter tops, doughnut fryers, deep fat fryers.

(Ingersoll is the only manufacturer of single-clad stainless-clad steel sheets.)

Send for a Free Sample of IngAclad Steel and a copy of our new Facilities and Products Brochure.

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Borg-Warner Corporation
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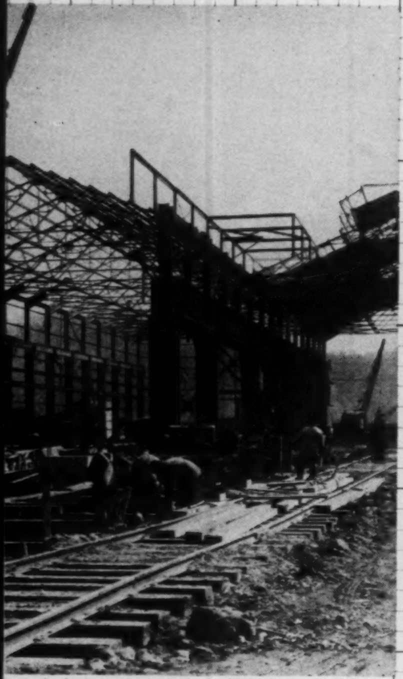
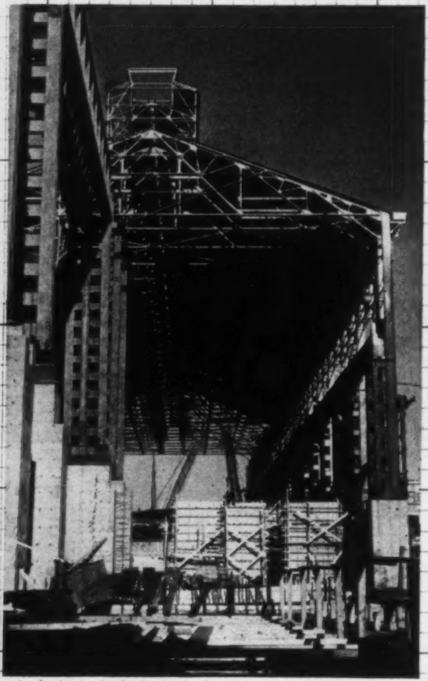
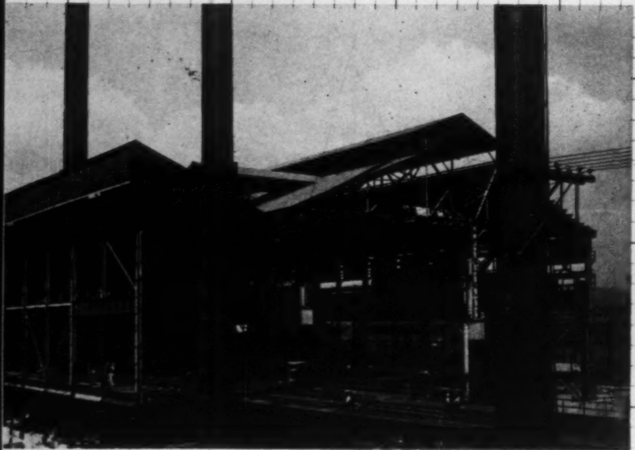
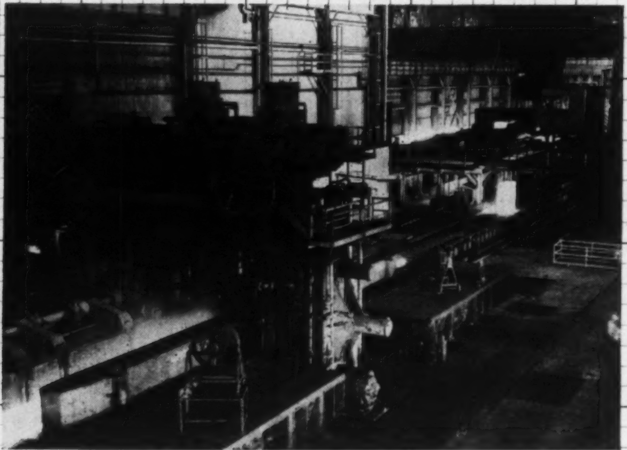








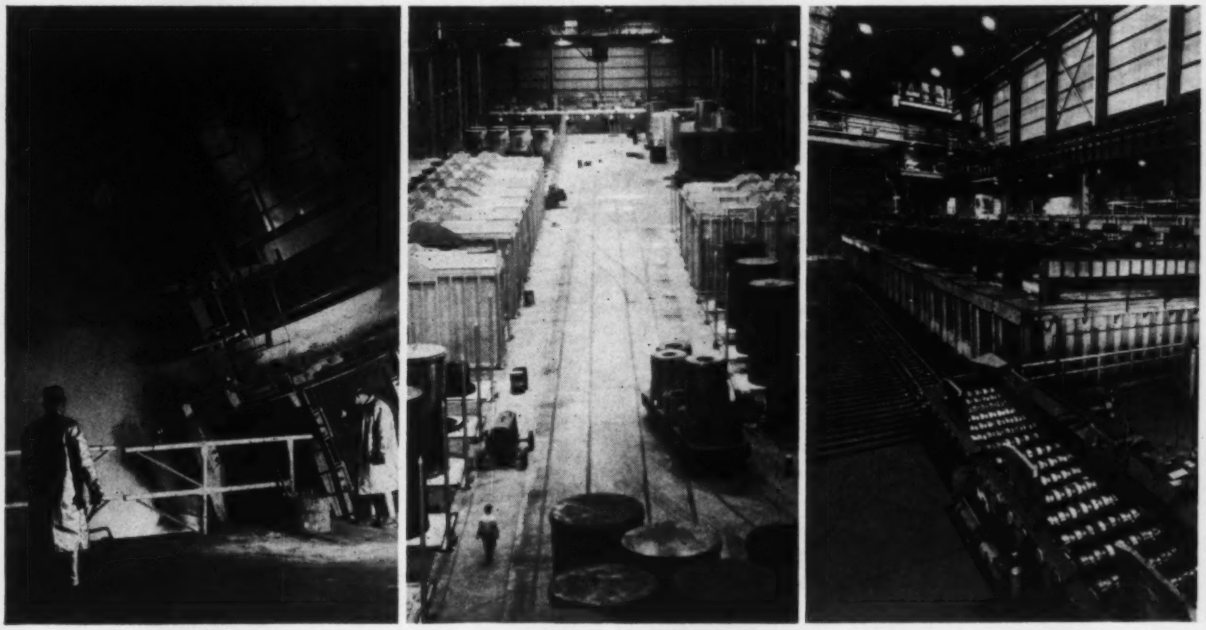
-DRESSLER

and Manufacturing

for the STEEL INDUSTRY

SWINDELL-DRESSLER engineering covers the range of steelmaking requirements from feasibility studies to complete plants and owners' key. Integrated steel mills, basic oxygen steel plants, electric steel melt shops, gas cleaning systems, departmental expansion or remodernization are among the many areas served by this long-experienced metals engineering organization.

- In manufacture, SWINDELL applies a background of 112 years to the most modern melting, annealing and heat processing of steel. Electric arc, open hearth, car bottom, annealing and malleableizing furnaces; soaking pits; billet heating, roller hearth and elevating furnaces with the Swindell nameplate serve the industry well.
- You can depend upon Swindell-Dressler engineering and Swindell products for your most exacting production demands. Let's discuss your program, at an early date.



SWINDELL-DRESSLER

CORPORATION

ENGINEERS AND MANUFACTURERS

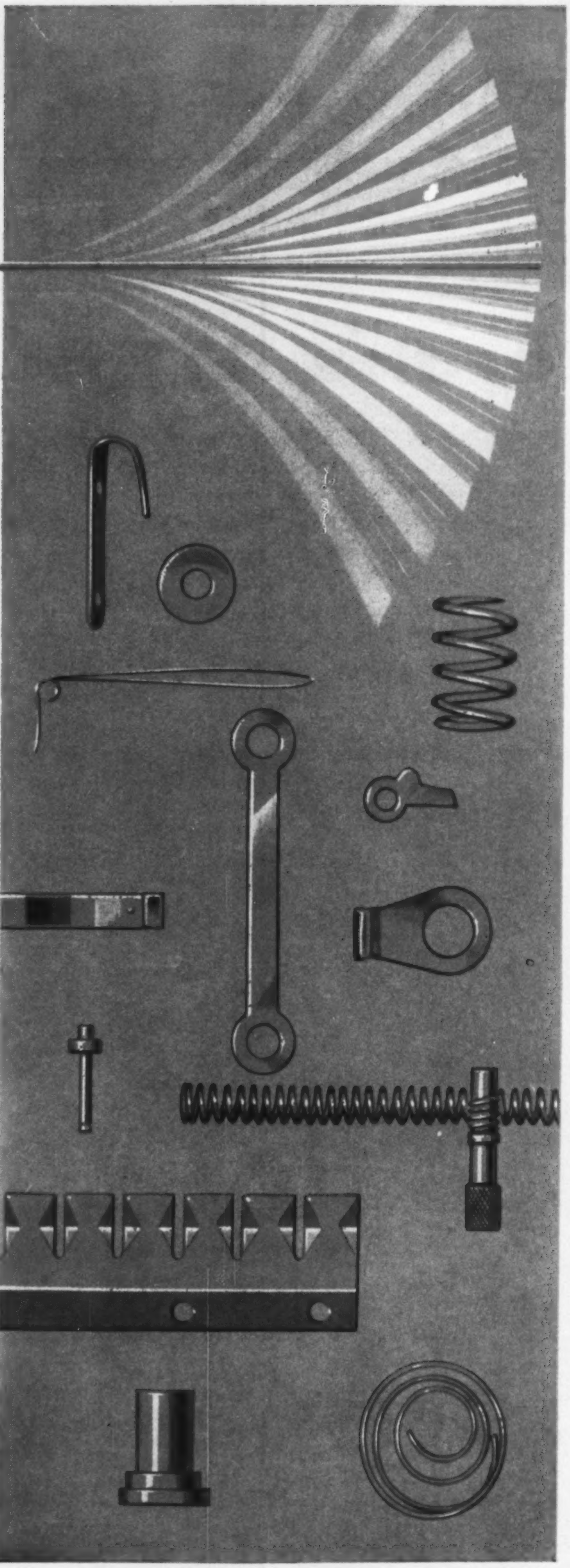
PITTSBURGH 30, PA.

The SWINDELL-DRESSLER CORPORATION of Canada, Ltd., Toronto, Canada

SUBSIDIARY OF PULLMAN INCORPORATED

DURAFLEX

the more durable, ductile, flexible phosphor bronze—at no extra cost



Here is one of the most versatile of phosphor bronzes. The superfine-grain structure of Duraflex provides a considerable improvement in fatigue life over regular phosphor bronze. Now you can obtain higher endurance limits with greater formability. It's ductile. It's resilient. It's corrosion-resistant!

This new, higher quality Anaconda phosphor bronze is now available in several standard phosphor bronze alloys—in strip metal up to 0.062″ thick and up to 14″ wide in all standard tempers, and in wire up to 3/16″ diameter. Duraflex strip is also available in long rolls.

Within the capabilities of size and alloy composition, Duraflex strip and wire can be applied to the innumerable uses for which conventional phosphor bronzes are employed, and in most instances provide longer and more efficient service. *Yet Duraflex sells for the same price as regular phosphor bronze in the same alloys and forms.*

Publication B-38 tells the story. Write for your copy—or for any assistance from our Metallurgical Dept. in selecting the proper alloys for your metalworking projects. Address: Anaconda American Brass Company, Waterbury 20, Conn. In Canada: Anaconda American Brass Ltd., New Toronto, Ontario. 61-1148

DURAFLEX®

A product of

ANACONDA®
AMERICAN BRASS COMPANY

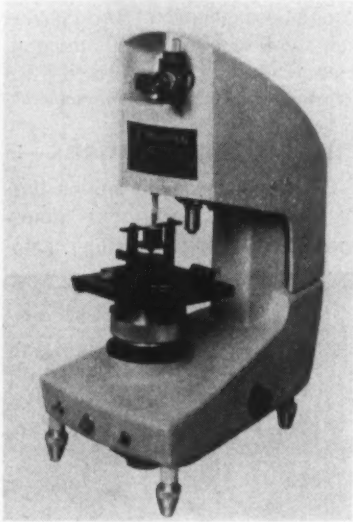
Previews Point Up Highlights Of the Detroit Metal Show

Keep your eyes peeled for these exhibits as you walk the aisles of the ASM Metal Show.

By checking the latest developments in metals technology, you may find a way to boost production and profit outlook.

How Hard is It?

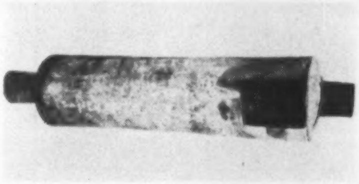
This semi-automatic micro hardness tester provides accurate measurements of very-restricted areas. It's on display at the Show, where a continually-operating slide projector will be used to show it, and other testors, performing difficult hardness-gaging tasks. (Wilson Mechanical Instrument Div., American Chain & Cable Co., Inc., Booth 952)



For more data circle No. 69 on postcard, p. 207

Coats With Stainless

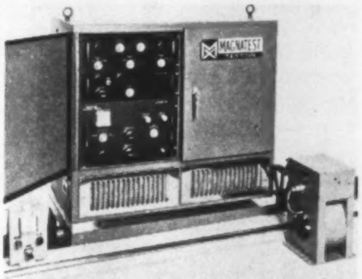
A truck muffler still serviceable after 500,000 engine miles will be one of the features at the exhibit of Alloy Surfaces Co., the developer of Alphatizing. This gaseous process creates a stainless-steel surface on ordinary mild steel by chromium diffusion. Among the Alphatized parts slated for exhibit are an engine part for a compact car, communication-relay components, steel crimping rolls for the canning industry, and a variety of powdered-metal parts. (Booth 808)



For more data circle No. 70 on postcard, p. 207

Testing System

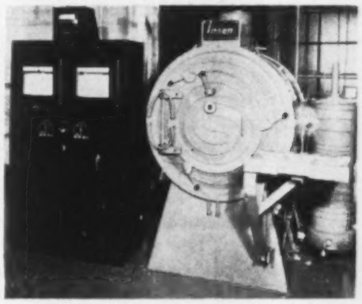
A new automatic inspection system offers mill-speed eddy-current testing of electric-weld tubing from ¼-2½ in. OD. It deals with butt-weld pipe from ½-4 in. OD. All controls, sensing elements, and read-out and marking devices are designed to eliminate human error or operator judgment. Standard or specially-engineered feeders provide proper passage of the tubing or pipe through the coil. This is done with constant speed, a minimum of deviation from the centerline of the coil, and access to the coils for change-over. The electronic instrumentation and power supply are housed in a floor-mounted enclosure measuring 42-in. wide, 30-in. high and 22-in. deep. (Magnaflux Corp., a subsidiary of General Mills, Booth 368)

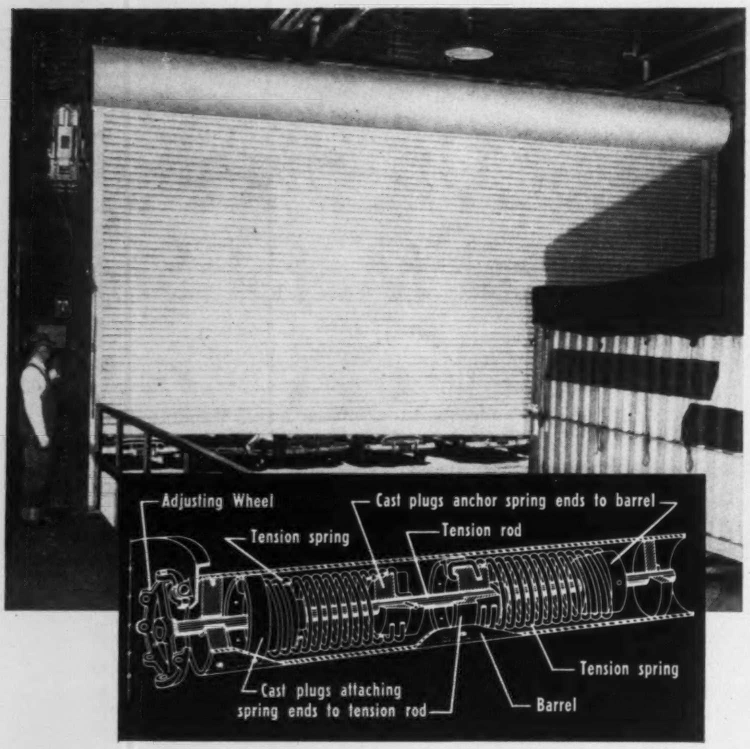


For more data circle No. 71 on postcard, p. 207

Fast Heating, Cooling

Fast heating up to 2400°F, coupled with fast cooling, is obtained in a new automatic, high-vacuum, heat-treating unit. The furnace has a work space 15-in. wide, 24-in. deep, and 10-in. high; a maximum vacuum of 0.1 micron Hg; an input of 50 kw; and an operating temperature of 2400°F. The unit can be used for hardening of high-speed, brazing of stainless, and annealing of refractory metals and special alloys. Total working floor space is 10 x 12 ft. In operation, the work load is placed in a basket on the charging platform. The operator manually opens the door, swings the loading platform into position in front of the unit and pushes the work basket into the furnace. The platform is then swung aside and the furnace door sealed. At the control cabinet, the operator sets the time at pre-heat soak, and the time at high-heat soak. After pressing the start button, the unit will automatically per-




Adjusting Wheel
Cast plugs anchor spring ends to barrel
Tension spring
Tension rod
Tension spring
Cast plugs attaching spring ends to tension rod
Barrel

There's a "Barrel of Difference" in Kinnear Rolling Door Quality!

"Longer door life at lower cost" — so often noted by users of Kinnear Rolling Doors — is due to extra strength and quality built into every feature, *including the unique counterbalance system "hidden" beneath the door's hood!*

As illustrated above, special cast plug devices anchor one end of each spring to the barrel, and to the other end to the tension rod, which extends through the door bracket into the adjusting wheel.

No disassembly required to adjust total curtain tension

The adjustment wheel turns all springs an equal amount, in the same direction. The ideal counterbalance action is quickly and easily arrived at, without any disassembling, and tension is always equal on each spring, at all points of curtain travel. This assures maximum service life for the door and its complete counterbalance mechanism.

Every Kinnear Rolling Door is REGISTERED for your protection

Here's "life extension" that protects your Kinnear door investment far into the future: Full details of every door are kept in fireproof vaults. In case of accident or mishap, new parts are always quickly available for any Kinnear Door — no matter how long it has been in use!

Add these advantages to the fact that no other type of door saves so much usable floor, wall and ceiling space—nor combines so much all-metal protection with quick, complete, jamb-to-jamb doorway clearance—than Kinnear Rolling Doors. The result explains why Kinnear Doors are so widely preferred in industrial, commercial and institutional buildings of every type. Write for complete information on Kinnear Rolling Doors!

KINNEAR®
ROLLING DOORS
Saving Ways in Doorways

The KINNEAR Mfg. Co.
FACTORIES:
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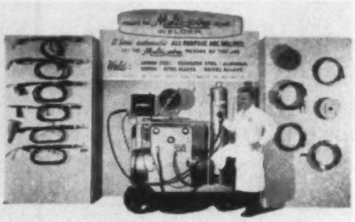
Representatives in All Principal Cities

form all functions, and upon completion of the last cycle, ring a bell to signal the operator that the work can be unloaded. The unit can then be immediately reloaded. (Ipsen Industries, Inc., Booth 161)

For more data circle No. 72 on postcard, p. 207

Multi-Wire Welder

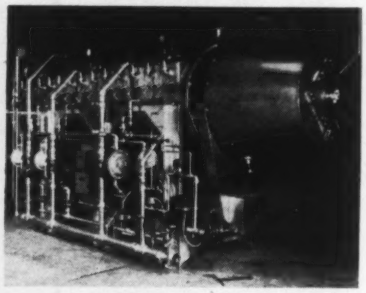
This combination welder and matched wire feeder will utilize all the new semi-automatic welding processes. A family of welding guns has been developed for each of these processes. When changing from one process to another, all you have to do is attach the appropriate gun and cable assembly. Then installing the correct drive rolls and wire guides completes the conversion and you're ready to roll. (Hobart Brothers Co., Booth 720)



For more data circle No. 73 on postcard, p. 207

Pushbutton Furnaces

By keeping parts in motion during heating, exposure to atmosphere, and during quenching, automated furnaces provide top-notch processing uniformity. Motion of the parts in the furnace retort insures that each part receives the same heat and exposure to the atmosphere as every other part. Motion of parts in the rotary quenching drum provides a superior quenching action to obtain max-

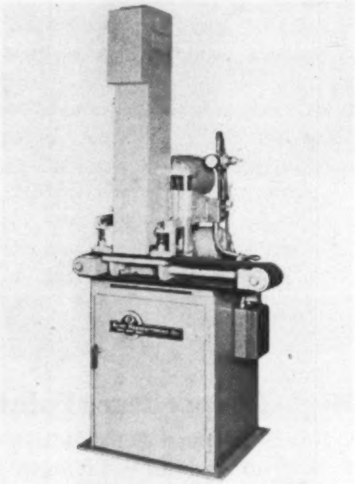


imum-hardness uniformity. All these advantages are offered in a new line of "Automation" furnaces and quenching tanks. (American Gas Furnace Co., Booth 821)

For more data circle No. 74 on postcard, p. 207

Automatic Finishing

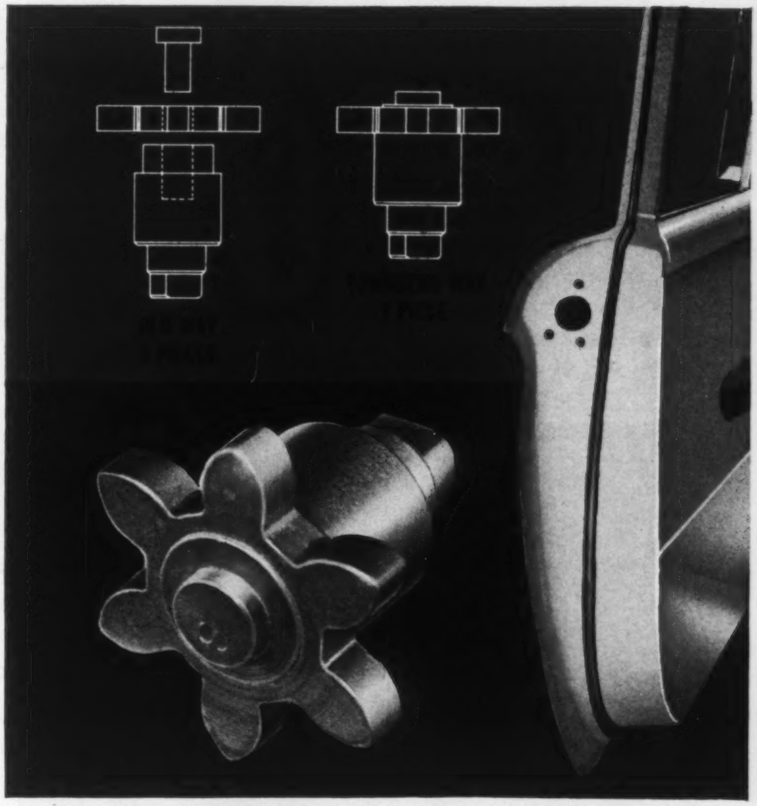
A new, low-cost, abrasive-belt finishing machine will be a feature at the Show. This versatile newcomer performs flat grinding, deburring and polishing operations on such parts as bars, strips, blanks, stampings, forgings, die castings and sand castings. Plastic, ceramic, wood and rubber parts can also be finished on the compact machine. The unit features a motorized conveyor belt that carries the work under spring-loaded hold-down rollers and the abrasive-belt contact wheel. Multiple head assemblies can be mounted in tandem along one long conveyor belt to perform production, progressive-finishing operations. These heads can also be mounted on a bench or used in conjunction with rotary tables. (Acme Mfg. Co., Booth 263)



For more data circle No. 75 on postcard, p. 207

Controls Carburizing

Flexibility in a new gas-heated furnace allows for processing a wide variety of operations and time cycles over a broad temperature range. The equipment can be used for atmosphere-controlled carburizing, carbonitriding, carbon restoration, normalizing, annealing and



Auto maker saved $22 per thousand with Townsend Ultra-Special part

This Ultra-Special part is made by the Townsend Ultra-Special cold-forming process for $22 less per thousand pieces than the former three-piece assembly made by another method.

One of these automobile door latch rotors is used in each car door by a major manufacturer. Their annual savings—by using this part—is quite substantial.

Cold forming adds strength to make a tougher part while holding dimensional tolerances. In developing these Ultra-Special parts, Townsend's engineers combine such processes as cold-heading and impact extrusion—or, interim heat treatments and coatings. The result is an extended range of standard production equipment far beyond ordinary limitations.

You benefit directly by using Townsend Ultra-Special parts in the assembly of your products. Your increase in profit potential is a direct combat to competition. A Townsend engineer will be happy to discuss your production assembly. Write Townsend Company, P. O. Box 71-B, Ellwood City, Pa.

A textron COMPANY

Townsend Company

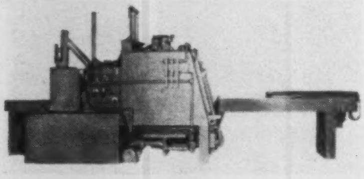
ESTABLISHED 1816

Engineered Fasteners Division

ELLWOOD CITY · PENNSYLVANIA

In Canada: Parmenter-Bulloch Manufacturing Co., Limited, Gananoque, Ontario

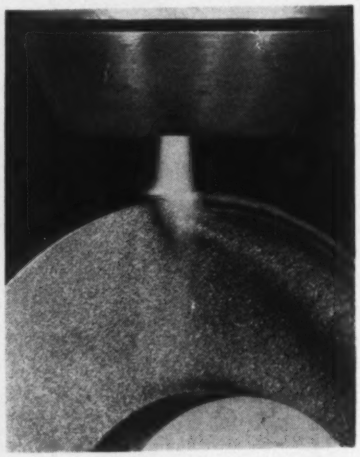
hardening in a temperature range from 1400°-2000°F. The furnace features a patented transfer system. It's designed so that no part of the system is ever exposed to heat other than when the work is being transferred. (Sunbeam Equipment Corp., Booth 721)



For more data circle No. 76 on postcard, p. 207

Weld Surfacing

Plasmarc weld surfacing, a precision method for depositing fully-fused overlays of wear- and corrosion-resistant alloys, will be demonstrated at the Show. This process deposits a very-thin fused coating with controlled dilution at high speeds. The overlay metal or alloy is fed as a powder into the torch. Intense heat results from the creation of a constricted plasma arc within the torch. This heat is transferred from the torch to the work. Argon gas, used to form the plasma, also shields the surfaced area from atmosphere contamination. Sister process to Plasma cutting, weld surfacing now moves from the laboratory into the production field. Equipment, which until now has been used primarily in experimental work, can be purchased at the Show. (Linde Co., a division of Union Carbide Corp., Booth 127)

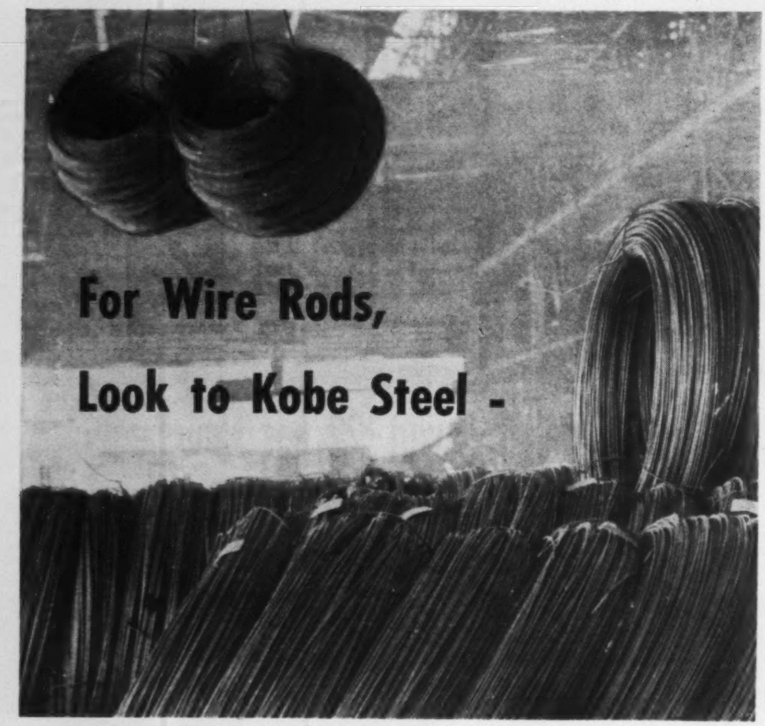


For more data circle No. 77 on postcard, p. 207

High-Temperature Paint

Recent progress in the development of exotic resins and refractory materials has led to even-further improvement in the performance characteristics of a custom-made coating. Easy application is one big

PYROMARK®
HIGH TEMPERATURE PAINT
TYPE-STANDARD
COLOR-GREEN
TEMPIL



With 35 years of experience in the production of low carbon steel wire rods, and a proud record of being the first to produce high carbon steel wire rods in Japan over 30 years ago.
Kobe Steel, with the completion of its new No. 5 mill in June of 1961, now has production capacity of 740,000 tons annually and is known as the oldest, largest and most versatile manufacturer of steel wire rods in the Far East.
Particularly famous for the high quality of its high carbon, alloy and stainless steel wire rods, Kobe Steel exports to every major area of the world.

KOBE STEEL WORKS, LTD.

Head Office: Kobe, Japan Cable: "KOBESTEEL KOBE"
New York Office: 80 Pine St., New York 5, N.Y., U.S.A.
Düsseldorf Office: Immermann St., 10, Düsseldorf, West Germany

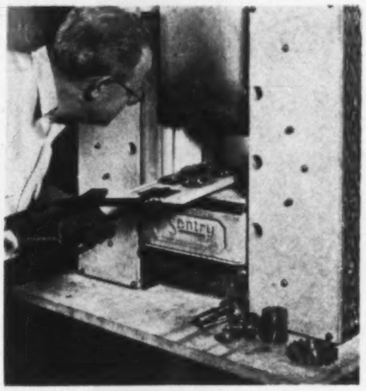
Main Products: Wire Rods — High and Low Carbon Steel, Alloy and Stainless Steel
Wire Products • Bars, Pipes and Tubes • Arc Welding Electrodes • General Machinery

advantage. This coating sprays or brushes like ordinary paint. However, after a brief preliminary cure at 500°-600°F, it will survive temperatures of 2500°F, and, in some cases, even-higher heats. Another bonus feature is excellent heat-shock resistance. On most metal surfaces, the new formulation will continue to adhere tenaciously—often to the limit of the base metal. (Tempil Corp., Booth 928)

For more data circle No. 78 on postcard, p. 207

Electric Furnace

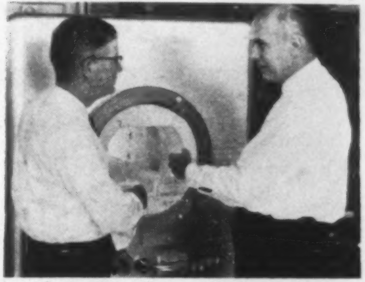
Metal Show visitors are invited to bring samples of their high-speed-steel tools for an on-the-spot demonstration of hardening. Feature unit at this display is an up-to-date electric furnace which produces scale-free, decarburization-free hardening of "moly" high-speed steel. A positive pretective atmosphere is created within the furnace work chamber by Sentry Diamond Blocks. No external atmosphere-generating equipment is needed. As a result, this simple, effective atmosphere requires no adjustment or special operator skills. Tools can be "soaked" to assure full hardness without danger of surface deterioration. (The Sentry Co., Booth 930)



For more data circle No. 79 on postcard, p. 207

Heating Equipment

Two design innovations will be unveiled for the first time during the Metals Show—a new type of atmosphere furnace and a newly-designed air dryer. Of particular interest to industry in and about the Detroit area is a new "high purity" open-chamber furnace which answers a broad spectrum of tool-hardening, brazing, sintering and general heat-treating problems. New construction promotes fast temperature response. It also eases maintenance of the low dew points that are essential in heat treating tool steels. Also being shown for the first time is an instrument air dryer. This unit produces effluent dew points of −85°F at air pressures of 100 psig. It's wall mounted, and it features "module" construction. (C. I. Hayes, Inc., Booth 938)



For more data circle No. 80 on postcard, p. 207

4 ULTRASONIC PROBLEM BUSTERS by BRANSON

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NEW CENTRIFUGAL AIR COMPRESSORS BY CLARK

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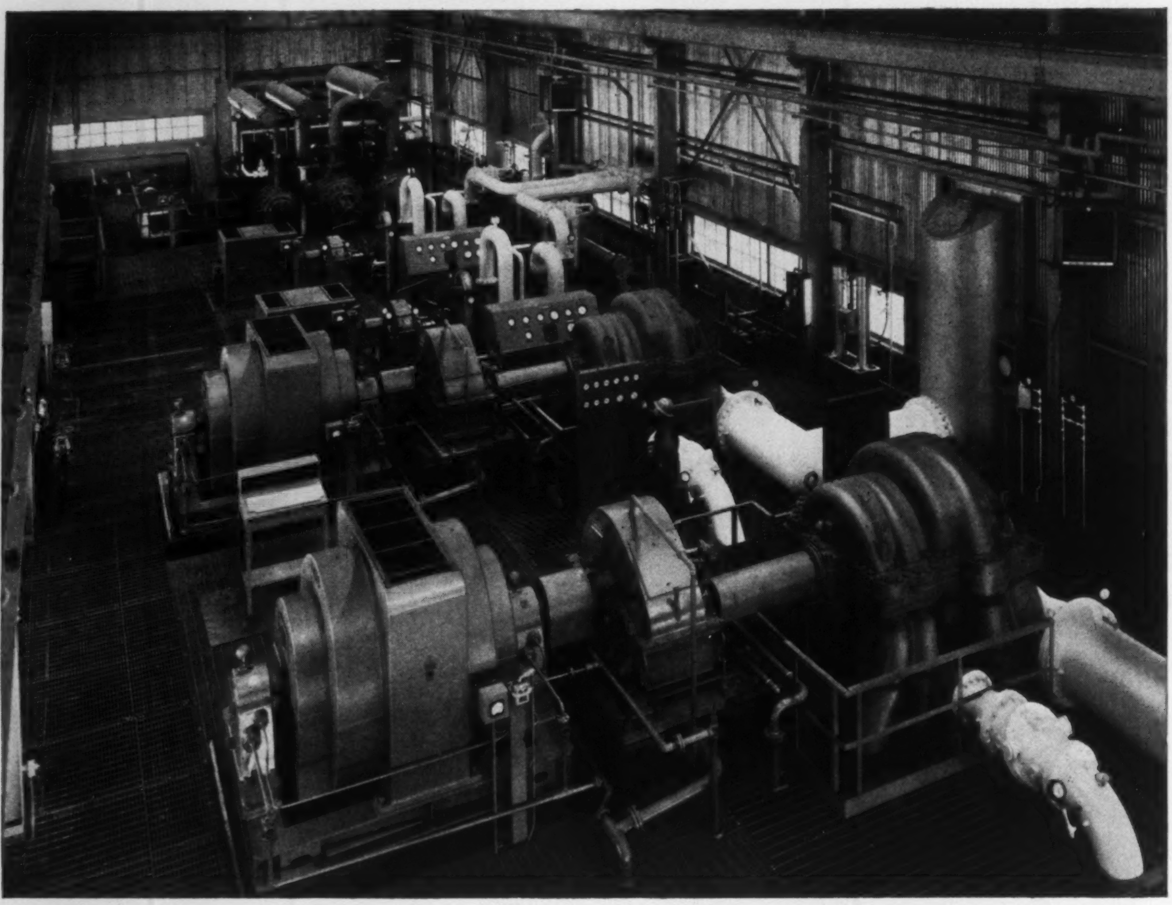

One good reason why so much U. S. oxygen capacity for steelmaking is handled by Clark compressors, is the ability of Clark engineers to develop complete compressor systems.

A typical steel mill oxygen plant installation is pictured above. In addition to being equipped with four proven Clark centrifugal oxygen compressors and a non-lube reciprocating unit handling nitrogen, this plant uses the new Clark *IsoTemp* centrifugal air compressor. Two of these machines are shown handling "100 lb. air" in the first stage of air separation.

Twenty-five *IsoTemp* compressors have been purchased for installation throughout the world after a careful analysis of features by informed U. S. and European engineers. Among the factors which influenced their choice: Four-stage, isothermal type design; the use of integral base-mounted intercoolers between each compression stage for maximum efficiency; low installation cost as a result of compact design; isolated bearing chambers combined with a unique seal porting system to eliminate lube oil contamination of the compressed air stream.

The user's confidence in the reliability of the new Clark *IsoTemp* is well founded. These machines have met all predicted performance guarantees and have proved trouble-free in every respect.

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■ Cobo Hall, in the nation's auto capital, is the site of this year's Metal Show, Oct. 21-27. Over 200 timely technical papers will be presented by the American Society for Metals and nine other participating societies. These practical sessions will report new ideas and the latest advances in the metals field. Other special events include luncheons, a dinner and a banquet. Highlight of this ASM Annual Banquet will be a talk given by Gen. Bernard A. Schriever, U. S. missile boss.

TECHNICAL PROGRAM

Saturday, Oct. 21

ASM Seminar: Ultra-High Purity Metals

Morning Session:

"Why Ultra-Pure Metals?," W. G. Pfann, Bell Telephone Laboratories

"Ion Exchange Methods for Obtaining Pure Metals," F. H. Spedding, J. E. Powell, Iowa State University

"Pure Metals From Chemical Processes," H. A. Wilhelm, David Peterson, Iowa State University

Afternoon Session:

"Electrolytic Preparation of Pure Metals," D. H. Baker, Jr., T. A. Henrie, U. S. Bureau of Mines

"Purification by Zone Melting and Very High-Temperature Melting Techniques," J. H. Wernick, Bell Telephone Laboratories

"Analysis for Trace Elements," Ph Albert, Vitry Laboratories, Paris

Sunday, Oct. 22

ASM Seminar: Ultra-High Purity Metals

Morning Session:

"Mechanical Properties of High Purity Metals," R. L. Smith, A. A. Hendrickson, Michigan Tech

"Some Annealing Phenomena In Ultra-High Purity Metals," K. T. Aust, J. W. Rutter, General Electric Co.

"Metallographic Problems Resolved by Using Metals of Very High Purity," G. Chaudron, Vitry Laboratories, Paris

Afternoon Session:

"Effect of Trace Impurities on Electrical Properties," J. E. Kunzler, Bell Telephone Laboratories

"Effect of Trace Impurities on Thermoelectric Properties," W. P. Pearson, National Research Council, Canada

"Electromagnetic Properties of High Purity Metals," W. A. Harrison, General Electric Co.

ASM-AIME Joint Session: Professional Activities

Evening Session:

"Program of the Metallurgy and Ceramics Foundation," G. A. Roberts, Vanadium-Alloy Steels Corp.

"The Question of Establishing a National Academy of Engineering," H. Work, Engineering Foundation

Monday, Oct. 23

Morning Program:

ASM Engineering Session: Corrosion in Automotive Applications (I)

"Materials for Anti-Smog Devices," J. J. Moran, E. N. Skinner, International Nickel

"Evaluation of Materials for Automotive Exhaust Systems," L. H. Boguski, Republic Steel Corp.

"Corrosion Properties of Low Alloy-High Tensile Steels," S. K. Coburn, U. S. Steel Corp.

ASM Scientific Session: Mechanical Properties of Steels

"Parameters Affecting Fracture Toughness of High-Strength Steel," P. M. Lorenz, Boeing Airplane Co.

"Yield Behavior of Alloy Steels at Low Strain Values," G. S. Reichenbach, M. I. T.; D. A. Brown, Stanford Research Institute; P. G. Russell, Alloyd Corp.

"Noxious and Innocuous States of Hydrogen in Iron," D. J. P. Adenis, Dow Chemical Co.; W. M. Baldwin, Jr., Case Institute of Technology

"Effect of Temper Brittleness on Dry Friction Wear of Martensitic Steel," J. J. Kauzlarich and R. R. Hagglund, Worcester Polytechnic Institute; J. P. Modrak, Rochester Institute of Technology

"Repeated Tensile Loading of Iron and Steel," C. P. Sullivan, B. L. Averbach, M. Cohen, M. I. T.

SNT Session: Educational Survey

"Orientation and Scope of Present NDT Field," D. W. Ballard, Sandia Corp.

"Radiography, Including Isotope Radiography," W. D. Kiehle, Eastman Kodak Co.

"Magnetic Particle Inspection," R. S. Peterson, Sperry Products, Inc.

"Eddy Current Test Methods," J. W. Allen, Budd Co.

AIME Session:

Protective Coatings and Processing of Refractory Metals

"Protective Coatings for Tantalum and Its Alloys," W. D. Klopp, H. R. Ogden, Battelle Memorial Institute

"Development of Oxidation Resistant Coating for Mo," P. J. Chao, D. K. Priest, The Pfaudler Co.

"Oxidation Resistant Aluminide Coating on Cb Alloy F-48," S. Foldes, General Electric Co.

"Properties of Refractory Metals Sprayed Under Controlled Environment," M. A. Levinstein, General Electric Co.

"Observations on Infiltration of Porous Structures of Mo, W and Their Carbides with Cu in Vacuum and Hydrogen," H. H. Hirsch, General Electric Co.

"Brazing Alloy Systems for Joining Cb-Base Alloys," W. R. Young, E. S. Jones, General Electric Co.

Theory of Work Hardening

Two papers to be announced

Effects of Surface Environment on Strength (I)

"Interaction of Surface and Strength Phenomena," E. S. Machlin, Columbia University

"Recent British Thin Foil Experiments," J. Silcox, Cambridge University

"Stresses in Overgrown Films on Crystalline Substrates," N. Cabrera, J. H. van der Merwe, University of Virginia

"Electromechanical Effect in Semi-conductors," J. H. Westbrook, General Electric Co.; J. J. Gilman, Brown University

"Influence of Thermal-Mechanical History on Embrittlement of Al Alloys by Hg," H. Nichols, W. Rostoker, Armour Research Foundation

High-Purity Iron and Its Dilute Solid Solutions (I)

"Preparation and Analysis of High-Purity Iron and Its Dilute Solid Solutions," R. L. Smith, B. Park, J. A. Van Westenberg, Michigan College of Mining and Technology.

"On the Iron Phase Transformation at High Pressures," R. S. Davis, Arthur D. Little Inc.

"Thermal, Magnetic, and Electrical Properties of Fe With Various Solutes," A. Arrott, J. E. Noakes, Ford Motor Co.

Afternoon Program:

ASM Engineering Session: Corrosion in Automotive Applications (II)

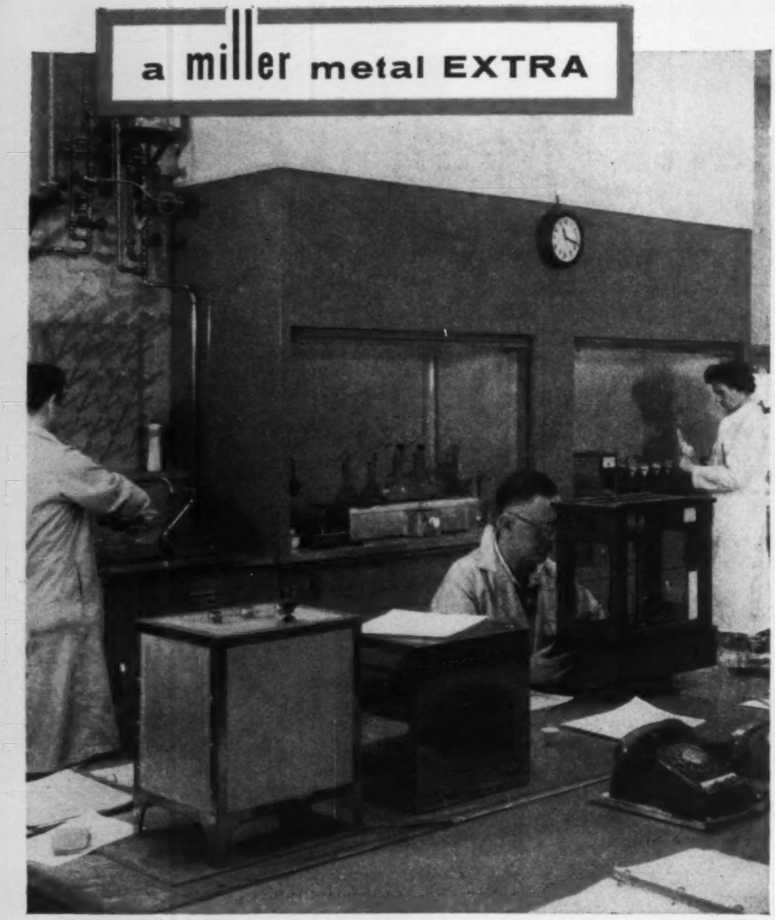
"Corrosion in Action (Film)," International Nickel Co.

"Galvanized Steel for Automotive Use," J. C. Widman, Ford Motor Co.

"Paint Systems for Corrosion Protection," N. Price, C. C. Durbin, Chrysler Corp.

ASM Special Session: Vacuum Techniques in Metallurgy

"Vacuum Processing Theory," H. W. West-



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PROGRAM

eren, C. I. Hayes, Inc.

"Vacuum Theory & Applications," C. Norndorf, Consolidated Vacuum Corp.

"Vacuum Furnace Instrumentation and Controls," P. Webster, Minneapolis-Honeywell Regulator Co.

"Vacuum Furnace Practice," R. Korf, Woodward Governor Co.

ASM Scientific Session: Steels

"Effect of Prestraining and Retempering on AISI Type 4340," E. T. Stephenson, Bethlehem Steel Co.; M. Cohen, M.I.T.

"Direct Reduction of Ferric Oxide by Solid Carbon in Vacuum," I. S. Yun, Seoul National University

"Effect of Concurrent Straining on Annealing Behavior of Cold Rolled Vacuum-Melted Electrolytic Iron," A. Goldberg, Comision Fulbright De Intercambio Educativo; S. Gourney, U. S. Naval Postgraduate School

"Effects of Cb on Properties of Al-Killed, Medium-Carbon Steel," E. E. Fletcher, A. R. Elsea, Battelle Memorial Institute; E. C. Bain, Consulting Metallurgist, Sewickley, Pa.

"Processing Factors Affecting Magnetic Properties of Low-Carbon Steel," D. J. Knight, P. J. Adzema, Jones and Laughlin Steel Corp.

SNT Session: Educational Survey

"Three Possible Approaches to Educational Curriculum for NDT," G. N. Beaumariage, Jr., Sacramento State College

"Penetrant Inspections," R. G. Strother, Magnaflux Corp.

"Theory of Ultrasonics," P. K. Bloch, Branson Instruments, Inc.

"Applications and Interpretations of Ultrasonics," W. C. Hitt, Automation Industries, Inc.

AIME Session:
Processing of Refractory Metals

"Processing and Properties of Arc Cast Tungsten Sheet," C. F. Mueller, W. J. Schoenfeld, Universal-Cyclops Steel Corp.

"Arc Melting and Hot Workability of Tungsten Alloys," R. G. Carlson, General Electric Co.

"Evaluation of Variables In Production of Arc-Cast Mo Alloy Sheet," W. A. McNeish, Universal-Cyclops Steel Corp.

"Processing and Properties of Mo Mill Products from Massive Isostatically Pressed and Sintered Billets," L. L. France, F. P. Giannakos, Universal-Cyclops Steel Corp.

"Effect of Microstructure on Workability and Properties of Vacuum Hot Pressed Cb Alloy," T. L. Robertshaw, R. G. Frank, I. Perlmutter, General Electric Co.

"Techniques for Preparation of High-Purity Refractory Metals," E. Fenn, M. Badiali, R. Bakish

"Strength of Sintered Ni-W," J. N. Brophy, H. W. Hayden, J. Wulff, M. I. T.

Effects of Surface and Environment on Strength (II)

"Interaction of Surfaces and Dislocations," A. K. Head, Commonwealth Scientific and Industrial Research Organization, Melbourne (Australia)

"Variation of Barrett Anomalous After-Effect With Torsion," D. B. Holt, University of Witwatersrand

"Influence of Thin Films of Solid Non-organic Compounds on Strength Properties of Metals," L. Nanis, J. H. Schulman, Columbia University

"Effect of Surface on Mechanical Deformation of Metal Single Crystals," I. R.

Kramer, Martin Co.

"Role of Surface on Strength, Ductility and Embrittlement of Metals," A. Berqhezan, European Research Associates

High-Purity Iron and Its Dilute Solid Solutions (II)

"Strain-Hardening, Recovery, and Recrystallization of Iron," W. C. Leslie, J. T. Michalak, U. S. Steel Corp.

"Plastic Deformation and Fracture of Iron," J. R. Low, Jr., General Electric Co.

"Effects of Solute Elements and Other Variables on Yield Stress and Brittle Fracture Stress of Iron," N. P. Allen, National Physical Laboratory (England)

Tuesday, Oct. 24

Morning Program:

ASM Engineering Session: Cold Forming of Metals (I)

"Shear Spinning of Refractory Materials," P. P. Crimmins, C. W. Heimlich, Aerojet-General Corp.

"Shear Forming of Tungsten Rocket Nozzles," J. E. Japka, General Electric Co.

"Cold Forming of Stainless Steel," G. Vacek, H. M. Harper Co.

"Hot Forming of High-Strength Steels," R. Blom, Ladish Co.

ASM Scientific Session: Carbides in Steels

"Study of Carbide Composition and Microstructure During Quenching and Tempering of 5% Cr-Mo-V Steel," G. P. Contractor, W. A. Morgan, Dept. of Mines and Technical Surveys; E. G. Schempp, Atlas Steels, Ltd.

"Creep Behavior of Austenitic Stainless Steel as Effected by Carbides Precipitated on Dislocations," F. Garofalo, F. Von Gemmingen, W. F. Domis, U. S. Steel Corp.

"Microstructural and Residual Stress Changes in Hardened Steel Due to Rolling Contact," J. J. Bush, W. L. Grube, G. H. Robinson, General Motors Corp.

"Electron Transmission Study of Tempering of Martensite in 0.42 pct C Steel," A. M. Turkalo, General Electric Co.

ASM—IHEA Session: Industrial Oven Applications in Metal Processing

"Metal Processing," J. W. Cornelius, DeVilbiss Co.

"Continuous Galvanizing," F. Sanborn, Industrial Ovens, Inc.

"Coating Continuous Strip," A. S. Dawe, J. O. Ross Engineering Div.

"Heat Treating Aluminum," A. J. Snow, W. S. Rockwell Co.

"Ovens in the Foundry," C. H. Barnett, Foundry Equipment Co.

Panel: Question and Answer Session

SNT Session: Military Ordnance and Nondestructive Testing

"Methods of Leak Detection for Propellant-Actuated Cartridges," W. H. Inglis, Frankford Arsenal

"A Primary Ultrasonic Standard," J. W. Orner, Watertown Arsenal

"Radiography of Cast High Explosives," R. A. Youshaw, W. R. Maddy, Naval Ordnance Lab.

"Thermographic Profiles of Material Discontinuities," D. Wilburn, Ordnance Tank Automotive Command

"Ultrasonic Technique for Testing Tires," J. Dudzinski, Detroit Arsenal

"Radiography of Large, Solid-Propellant Missile Motors With Linear Accelerator," J. H. Cusick, H. Heffan, U. S. Naval Ammunition Depot

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PROGRAM

AIME Session:

Continuous Casting

"Continuous Casting in Europe—Practice and Developments," I. M. D. Halliday, United Steel Companies, England

"Continuous Casting Experience at Atlas Steels," L. Nemethy, Atlas Steels Ltd. Canada

"Rolling Characteristics of Multiple-Section Continuously Cast Billets," J. Pearson, British Iron and Steel Research Assn; J. Savage, Continuous Casting Co., Ltd., England

Effects of Surface and Environment on Strength (III)

"Effects of Absorbed Polar Molecules on Etching and Yielding Behavior of LiF Crystals," A. R. C. Westwood, Research Institute for Advanced Studies

"Effect of Surface Condition on Mechanical Properties of Polycrystalline Ionic Solids," R. J. Stokes, Minneapolis-Honeywell Regulator Co.

"Effect of Controlled Surface Contamination on Ductility of Ionic Crystals," G. T. Murray, Materials Research Corp.

"Effect of Environment on High-Temperature Strength of Metals," M. R. Achter, U. S. Naval Research Laboratory

"Effects of Elastic Strain and Environment on Surface Free Energy of Solid Cu," S. Floreen, D. V. Ragone, E. E. Hucke, University of Michigan

Physical Metallurgy of Refractory Metals (I)

"Dislocation Substructure in Ta and W," S. Weissmann, Y. Nakayama, Rutgers University

"Substructure and Mechanical Properties of Refractory Metals," S. Allen, E. M. Passmore, B. S. Lement, Manufacturing Laboratories, Inc.

"Flow Characteristics of Zone-Refined Mo Over Temperature Range 4.2° K to 373° K," J. Van den Sype, R. Maddin, University of Pennsylvania; A. Lawley, Franklin Institute Laboratories

"Flow and Fracture of High-Purity Ta-W Alloys in Ductile-Brittle Transition Region," D. P. Ferriss, R. M. Rose, J. J. Wulff, M. I. T.

"Notch Sensitivity of Refractory Metals," A. C. Imgram, F. C. Holden, H. R. Ogden, R. I. Jaffee, Battelle Memorial Institute

"Effects of Dispersions on Recrystallization and Ductile-Brittle Transition Behavior of W," R. I. Jaffee, B. C. Allen, D. J. Maykuth, Battelle Memorial Institute

"Yield and Fracture in Polycrystalline Ta," M. A. Adams, Materials Research Corp.

Afternoon Program:

ASM Engineering Session: Cold Forming of Metals (II)

"Cold Forming, (Film)" National Machine Co.

"Steels for Cold Forming," J. V. Russell, Republic Steel Corp.

"Lubrication for Cold Forming," R. W. Perry, Parker Rust Proof Co.

"Cold Forming Practices," A. Braun, Braun Engineering Co.

ASM Scientific Session: Iron-Chromium Alloys

"Influence of Delta Ferrite-Carbide Segregates on Properties of 12 pct Cr Steel," E. A. Loria, Climax Molybdenum Co.

"Submicroscopic Structures in Tempering 410 Stainless Steel," J. J. Hauser, J. M. Capenos, B. R. Banerjee, Crucible Steel Co. of America

"Relationship Between Fatigue and Damping Characteristics and Microstructure of 12 pct Cr Steel," E. J. Dulis, V. K. Chandhok, Crucible Steel Co. of America; J. P. Hirth, Carnegie Institute of Technology

"Tensile Properties of Single Crystals of Fe-Cr Alloys," G. T. Horne, R. B. Roy, H. W. Paxton, Carnegie Institute of Technology

ASM-AGA Session: New Equipment and Techniques in Melting and Heat Treatment

"Solving Heat Transfer Problems by Thermolog," R. LaNeay, Selas Corp.

"Convection—Its Purposes and Principles," J. Huebler, Surface Combustion Div.

SNT Session: Mehl Lecture

"The Need to Know," C. H. Hastings, Avco Corp.

AIME Session:

Working of Cast Structures

"Evaluation of Concast Bloom Sections for Seamless Tube Production," H. B. Emerick, Jones & Laughlin Steel Corp.

"Effects of Forging and Rolling on Cast Steels," C. Wells, Carnegie Institute of Technology

"Role of High Strain Rates and Temperature on Deformation and Fracture Characteristics of Fe-C Alloys," W. Lawson, T. B. King, N. J. Grant, M. I. T.

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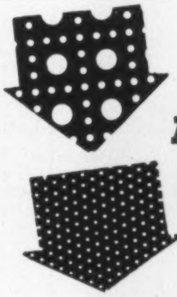

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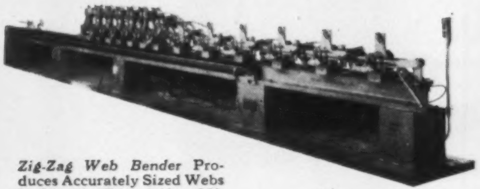

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PROGRAM

Vacuum Techniques in Metallurgy (I)

"Arc vs. Electron Beam Melting in High Vacuum Environments," R. P. Morgan, T. E. Butler, Union Carbide Metals Co.

"Production Applications of Electron Beam Heating to Refractory Metals," E. F. Baroch, W. A. Aschoff, Wah Chang Corp.

"Use of Electron Beams in Vacuum Metallurgical Process," J. C. Simons, P. L. Raymond, N. R. C. Equipment Corp.

"Purification Techniques for Arc-Melting Ta and W Base Alloys," M. L. Torti, C. A. Hornell, N. R. C. Equipment Corp.

"Furnace Reactions with Gases Which Affect Quality of Vacuum Induction-Melted Uranium," R. W. Endebrock, E. L. Foster, Battelle Memorial Institute

"Production of Pure Mo and Its Alloys by Floating Zone Melting," J. A. Belk, The War Office, England

Physical Metallurgy of Refractory Metals (II)

"Effect of Purity on Strength of High-Purity W at Elevated Temperatures," J. L. Orehotsky, General Telephone and Electronics Corp.

"Effects of Interstitials on Properties of Cb-Rich Alloys in Cb-W-Zr Systems," J. W. Clark, General Electric Co.

"Strengthening of Mo-Ti-Zr Alloys With C and B," M. Semchyshen, R. Q. Barr, Climax Molybdenum Co.

"Effect of Heat Treatment and Precipitation Hardening on Strength Properties of Mo-Base Alloys," W. H. Chang, L. P. Jahnke, General Electric Co.

"Effect of Yttrium and Selected Rare-Earth Additions on Removal of Interstitials from W and Mo," D. T. Klodt, J. F. Nachman, University of Denver

"Physical and Mechanical Properties of a Cr-Base Alloy," R. E. Cairns, New England Materials Laboratory; N. J. Grant, M.I.T.

"Electron Metallographic Techniques for Studying W Wires and Powders," C. F. Tufts, General Telephone and Electronics Laboratories, Inc.

Wednesday, Oct. 24

Morning Program:

ASM Annual Meeting

Election of ASM National Officers and Trustees for 1961-1962

ASM Campbell Memorial Lecture: By Dr. Lawrence Darken

SNT Session:

New Applications of Radiographic Techniques

"Neutron Radiography," H. Berger, Argonne National Lab.

"X-ray Image Enlargement System for Inspection of Missile Case Walls and Weldments," R. C. McMaster, Ohio State University

"Techniques for Low - Voltage Radiography," R. W. McClung, Oak Ridge National Lab.

"X-Ray Mass Attenuation Coefficients in the Range 50 to 150 KVP," B. E. Foster, J. W. Evans, Oak Ridge National Lab.

"Radiographic Behavior of Beryllium and Graphite," D. E. Elliott, J. L. Stokes, G. H. Tenney, Los Alamos Scientific Laboratory

"An Image-Intensifier Tube With High

Gain for 1-MEV Photons," D. T. Green, Picker X-Ray Corp.; W. F. Niklas, Rauland Corp.

NDT In the Utilities Industry

"Conventional and Nuclear Steam Generating Equipment," W. B. Brunn, E. S. Proctor, Combustion Engineering, Inc.

"Quality Control in Fabrication of Fuel Element Assemblies for Hallam Nuclear Power Facility," B. H. Dixon, Atomics International

"Realistic Inspection of Power Plant Components to Reduce Service Failures," H. Thielsch, Grinnel Co.

"Inspection of Turbine Generator Parts During Manufacture and After Service," D. L. Sauer, R. G. Matters, Allis-Chalmers Mfg. Co.

AIME Session:

Vacuum Techniques in Metallurgy (II)

"Zone Purification of Yttrium," W. C. Necker, General Electric Co.

"Separation of Sulphides by Vacuum Distillation," C. N. Banks, R. A. Campbell, R. R. Rogers, Canadian Department of Mines and Technical Survey

"Status of Vacuum Methods of Gas Analysis for Oxygen, Nitrogen, and Hydrogen in Metals," N. A. Gokcen, Aerospace Corp.

"Brazing and Heat Treating in Vacuum," R. F. Gunow, Vac-Hyd Processing Corp.

"Developments in Oil Diffusion Pump Design for Vacuum Metallurgy," M. H. Hablanian, N.R.C. Equipment Corp.

Nuclear Fuel Reprocessing—1: Pyroprocessing

"Phase Relations in Plutonium Halide Binary Fused Salt Systems," J. A. Leary, K. W. R. Johnson, Los Alamos Scientific Laboratory

"Processing of Uranium Dioxide Fuel by Salt Cycle Process," M. T. Walling, General Electric Co.

"Fused Salt Oxidation—Reduction Process for Plutonium Fuel Recycle," J. G. Reavis, Los Alamos Scientific Laboratory

"Recent Developments in ORNL Volatility Process," C. E. Guthrie, Oak Ridge National Laboratory

"Liquid Metal Processing of Fuel From Second Experimental Breeder Reactor," R. D. Pierce, L. Burris, Argonne National Laboratory

"Fluidized Bed in Radioactive Waste Disposal," J. I. Stevens, Phillips Petroleum Co.

Afternoon Program:

A S M Engineering Session: Unusual Metal Removal Techniques

"Chemical Milling," G. H. Fox, Jr., Turco Products

"Electrolytic Metal Removal Processes," L. A. Williams, Anocut Engineering Co.

"Ultrasonic Machining," (Author to be announced)

"Electrical Discharge Machining," D. H. Hill, General Motors Co.

ASM Scientific Session:

Nuclear Metals

"Liquidus Curves of Bismuth Fission-Product Systems," D. G. Schweitzer, J. R. Weeks, Brookhaven National Laboratory

"Effects of Alkali Metals on Solubility of U in Bi," D. G. Schweitzer, J. R. Weeks, Brookhaven National Laboratory

"Metallographic Studies of Al-Ni-U Bonds

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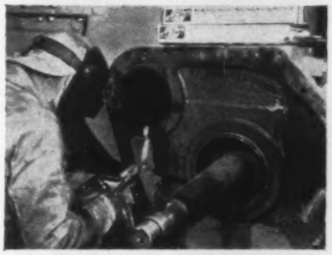

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in Nuclear Fuel Elements," C. L. Angerman, E. I. duPont de Nemours & Co.

"Effect of Oxygen on Properties of Zircaloy-2," L. S. Rubenstein, F. L. Shubert, J. G. Goodwin, Westinghouse Electric Corp.

Plastic Deformation

"Shear Deformation of Mg and Zn Single Crystals," W. L. Phillips, E. I. duPont de Nemours & Co.

"Effect of Stress Decreases on Creep of Al in Dislocation Climb Region," L. Raymond, W. D. Ludemann, N. Jaffee, J. E. Dorn, University of California

"Investigation of Intermediate Temperature Ductility Minimum in Metals," F. N. Rhines, P. J. Wray, University of Florida

"Cumulative Fatigue at High Plastic Strains," D. E. Gucer, Technical University of Istanbul

"Centrifugal Creep Testing on Pure Al," D. E. Deutsch, R. S. Carey, J. L. Hull, Aerojet-General Nucleonics

"Transient and Destructive Instability in Torsion," N. H. Polakowski, S. Mostovoy, Illinois Institute of Technology

ASM-MPIF Session: Powder Metallurgy Symposium

"Corrosion Resistant Powder Metallurgy Parts," S. Bradbury, Hoeganaes Sponge Iron Corp.

"Plastic Impregnation of Powder Metallurgy Parts," N. B. Newcomb, National Sinter-Seal Co.

"Pre-Alloyed Iron-Nickel Powders," N. I. Ananthanarayanan, University of Kansas

"Elevated-Temperature Impact Densification of Mo-UO, Powder Mixture," D. Murphy, R. Kirby, G. Hanks and J. Taub, Los Alamos Scientific Laboratory

"Application of PMPMA Materials Standard and Specifications Guide for Powder Metallurgy Parts," P. J. Failla, Johnson Bronze Co.

SNT Session:

Electrical and Magnetic Techniques

"Disturbance of Magnetic Fields by Discontinuities in Thin-Wall Steel Tubes," W. C. Harmon, F. E. Brammer, Republic Steel Corp.

"Eddy Current Testing of Tubular Steel Products," H. N. Nerwin, Magnaflux Corp.

"Eddy Current Inspection—Compilation of Case Histories," J. P. Scheuer, General Electric Co.

"New Eddy Current Techniques," R. L. Brown, H. L. Libby, General Electric Co.

"Controlling Eddy Current Testing of Tubing," R. C. Barry, Westinghouse Electric Co.

"Eddy Current Testing in the Petroleum Industry," P. L. Datt, T. R. Schmidt, Shell Development Co.

NDT in the Utilities Industry

"Testing of a Maintenance Tool for Power Plants," T. D. Carr, R. H. Zong, Philadelphia Electric Co.

"Nondestructive Testing Methods for Metallurgical Analysis," J. A. Klapper, Ebasco Services, Inc.

"Latest Nondestructive Testing Equipment and Techniques Used in Power and Nuclear Plants," (Presented by various manufacturers)

"Panel Discussion on Nondestructive Testing Problems"

AIME Session: Nuclear Fuel Reprocessing (II) Foreign and American Developments

"Thorium Recycle Developments," D. E. Ferguson, E. D. Arnold, O. C. Dean, W. S. Ernest, Oak Ridge National Laboratory

"Scientific Development of the Eurochemic Reprocessing Project," R. Rometsch, Eurochemic, Belgium

"Reprocessing Fast Reactor Fuels at Dounreay," D. M. Donaldson, K. Hartley, P. Lees, N. Parkinson, Atomic Energy Authority, United Kingdom

"Recent Developments in Processing Nuclear Fuels by Iron Exchange," D. B. James, E. L. Christenson, Los Alamos Scientific Laboratory

"Corrosion of Containment Materials by Molten Zn and Cd Alloys," J. DeKany, H. Lavendel, L. Burris, Argonne National Laboratory

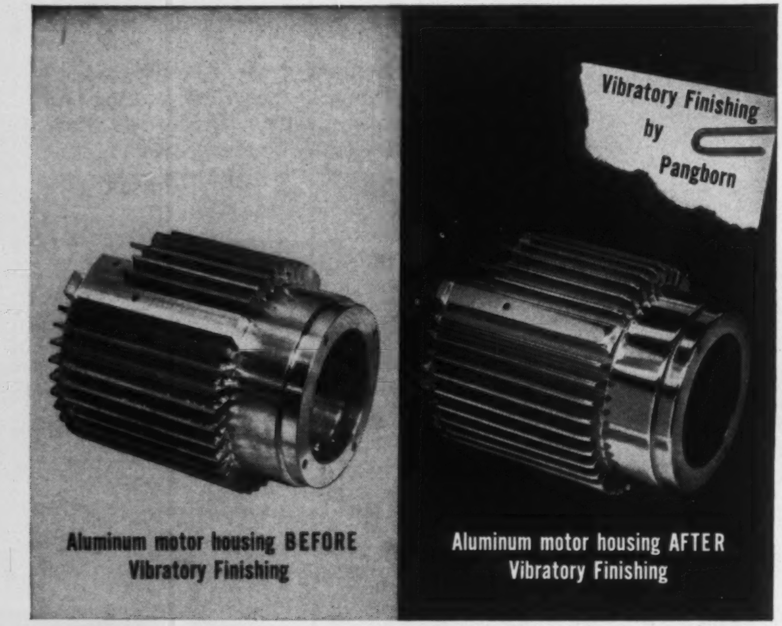
"Corrosion of Materials of Construction for Multipurpose Head-End Equipment in Proposed Fuel Reprocessing Schemes," W. E. Clark, Oak Ridge National Laboratory

Thursday, Oct. 25

Morning Program:

ASM Engineering Session: Nonmetallic Materials

"Economics of Plastic Moldings vs. Metal Die Castings," G. L. Graf, Jr., Dupont Co.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"Composition and Properties of High-Strength Adhesives," G. A. Jlkka, General Motors Corp.

"Fusion Bonding—New Method for Combining Plastic and Metal," W. R. Pascoe, Polymer Corp.

"Newer Plastic Materials—Effect On Metals Industry," H. McCann, Modern Plastics Magazine

ASM Scientific Session:

Physical Metallurgy

"Prediction of Atomic Mobility in Metallic Systems," O. D. Sherby, Stanford University; M. T. Simnad, General Atomic

"New Method for Determination of Liquid-Liquid Equilibria as Applied to Fe-C-Si-Mg Systems," P. K. Trojan, R. A. Flinn, University of Michigan

"Measurement of Interlamellar Spacing of Pearlite," B. Gregory, College of Science and Technology; H. T. Hall, G. Bullock, Allmanna Svenska Elektriska Aktiebolaget

"Quantitative Metallographic Analysis of Graphite Size in Ductile Cast Iron," J. H. Brophy, M.I.T.; M. J. Sinnott, University of Michigan

"Wrought Pb-Cd-Ni Alloys," D. N. Williams, K. R. Grube, R. I. Jaffee, Battelle Memorial Institute

Space-Age Metals (II)

"Effect of Surface Finish on Properties of Be Sheet," W. V. Ward, International Nickel Co.; C. O. Matthews, M. I. Jacobson, Lockheed Aircraft Corp.

"Influence of Warm Prestressing on Notch Properties of Several High-Strength Alloys," E. A. Steigerwald, Thompson-Ramo-Wooldridge, Inc.

"Strain Hardening Properties of High-Strength Sheet," F. R. Larson, J. Nunes, Watertown Arsenal Laboratories

"Additive Effects of Alloying Elements on Mechanical Properties of Cast Austenitic Alloys at 1500°F," D. L. Sponseller, R. A. Flinn, University of Michigan; R. W. Kraft, United Aircraft Corp.

"Hardness Anisotropy of Cb," D. L. Douglass, General Electric Co. ASM-AWS Session: New Welding Processes

"Electro-Slag Welding," W. H. Wooding, Arcos Corp.

"Applications of Electron-Beam Welding," E. A. Franco-Ferreira, Oak Ridge National Laboratory

"Developments in Friction Welding," M. B. Hollander, American Machine & Foundry

ASM-MTI Session: Panel

"Can Your Costs Be Reduced by Brazing Techniques?," Moderator, R. F. Gunow, Vac-Hyd Processing Corp.

"Hydrogen Brazing of Prototype Stainless Steel Fuel Elements for N. S. Savannah," D. C. Dilley, Ferrotherm Co.

"Vacuum Furnace Brazing of Stainless Steels," T. H. Crane, Kinetics Corp.

"Furnace Brazing of Steel Parts with Dissociated Ammonia," R. L. Evans, Syracuse Heat Treating Corp.

"Vacuum Brazing of Aircraft Alloys," N. K. Koebel, C. H. Ulbrich, Lindberg Engineering Co.

"Salt Bath Brazing of Aluminum" F. J. Fahrendorf, Handy and Harman

"Brazing Ferrous Alloys to Aluminum," R. Seal, D. W. MacVicar, Bi-Braze Corp.

SNT Session: Transportation and Nondestructive Testing

"NDT in the Auto Industry," R. B. Allured, General Motors Corp.

"Electronic Audit Gage," W. Gross, Performance Measurements Co.

"Use of Radioactive Tracers to Study Piston Ring Wear in Locomotive Diesel Engines," A. S. Pedrick, Southern Pacific Co.

"Density Tests on Concrete Using Gamma Irradiation," R. M. Jefferson, Sandia Corp.

"NDT in Rubber Tire Industry," G. H. Halsey, General Tire and Rubber Co.

"Information Centers' Role as Possible Technical Communication Media for NDT," M. J. Wahll, Battelle Memorial Institute

Afternoon Program:

ASM Engineering Session: Light Metals

"Magnesium and Automobiles," F. L. Burkett, Dow Chemical Co.

"Creativity with Aluminum and New Aluminum Applications," E. J. deRidder, Reynolds Metal Co.

"Beryllium—A Space Age Metal," T. J. Hughel, General Motors Corp.

ASM Scientific Session:

Space-Age Metals (II)

"Constitution and Transformation Behavior of Ti-8Al-8Zr-l (Ta + Cb) Alloy," H. Margolin, New York University; E. Ence, Republic Aviation Corp.

"Investigation of Notch Sensitivity in A-286 Alloy," G. B. Heydt, Carpenter Steel Co.

"Mechanical Properties of Unalloyed V," J. W. Farrell, Union Carbide Metals Co.

"Effect of Temperature Exposer on Microstructure of Ni-4.5 pct Ti Alloy," J. F.

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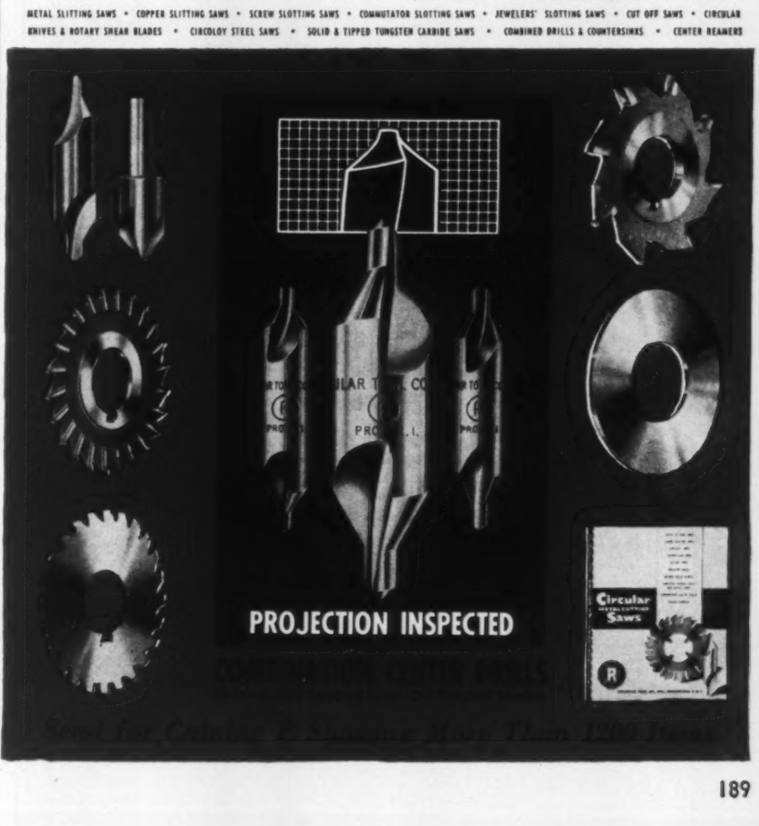
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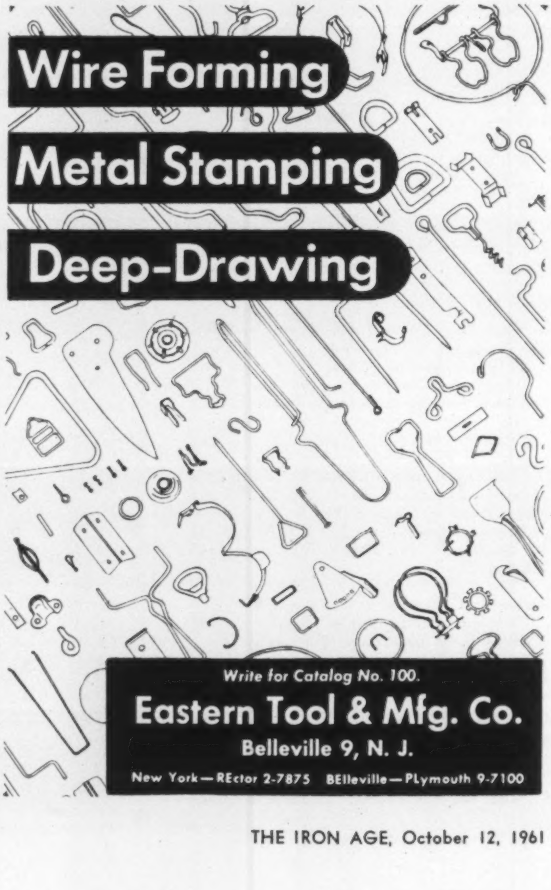

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Corrosion

"Morphology of Grain Boundry Carbides and Its Influence on Intergranular Corrosion of 304 Stainless," R. Stickler, A. Vinckier, Westinghouse Electric Corp.

"Corrosion Resistance and Mechanical Properties of Ti-Mo Alloys Containing Noble Metals," C. R. Bishop, Union Carbide Metals Co.; M. Stern, Linde Co.

"Investigation of Effects of Fabrication Variables on Corrosion Resistance of Zircaloy-2," H. S. Kalish, Nuclear Fuel Research Laboratory; H. M. Cobb, Olin Mathieson Chemical Corp.

"Propagation of Stress-Corrosion Cracking in Mg Alloy," W. M. Pardue, Battelle Memorial Institute; F. H. Beck, M. G. Fontana, Ohio State University

ASM-AWS Session: Gas-Shielded Welding Processes

"Survey and Classification of Gas-Shielded Metal-Arc Welding," P. J. Reippel, Battelle Memorial Institute

"Modern Uses of CO_2 in Gas-Shielded Arc Welding," W. B. Blackburn, International Harvester Co.

"Gas-Metal Arc, Arc-Spot and Continuous Welding of CRS Sheet," T. W. Shearer, Fisher Body Div., General Motors Corp.

ASM-UMA Session: Ultrasonics

"Transducer Design for Sonic Cleaning Systems," L. J. Lyons, Bendix Corp.

"Ultrasonic Cleaning and Inspection of Strip," H. F. Osterman, Branson Instruments, Inc.

"Ultrasonics for Machining," G. C. Brown, J. N. Behm, Sheffield Corp.

"A New Way to Measure Ultrasonic Cavitation," R. E. Heim, Westinghouse Electric Corp.; H. M. Goldsmith, Turco Products, Inc.

SNT Session: Enrico Fermi Plant

"Aspects of NDT at Enrico Fermi Atomic Power Plant," G. L. Parkinson, Power Reactor Development Co.

"International Scientific Progress in Field of NDT," G. H. Tenney, Los Alamos Scientific Lab.

"Reactor Tour and Film (Detroit Edison Co.)"

Friday, Oct. 26

Morning Program:

ASM Special Session: Economies in Research and Engineering Through Literature Searching

"Viewpoint of the Scientist," R. J. Howerton, University of California

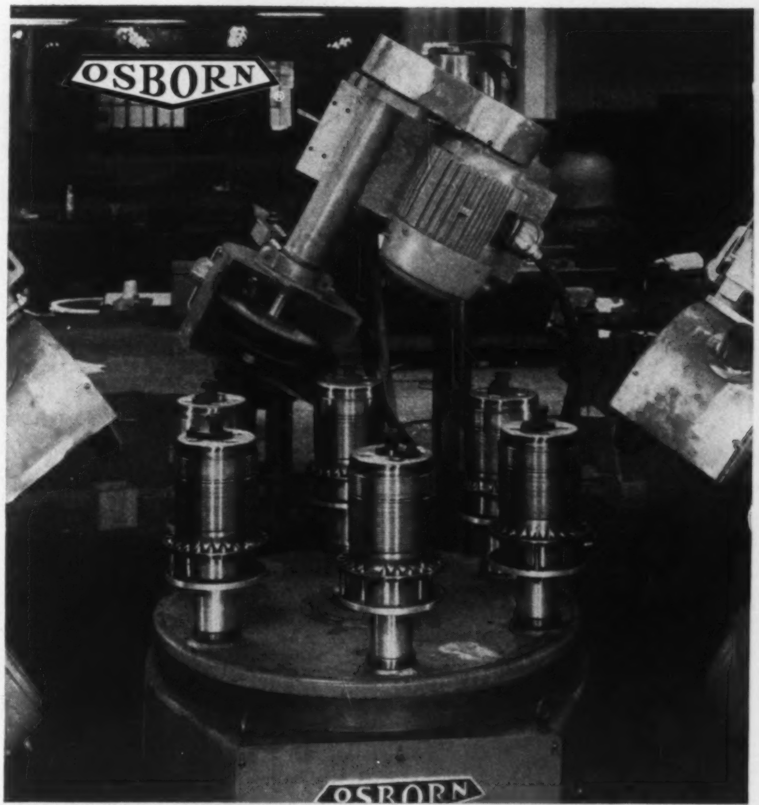
"Viewpoint of the Engineer," D. C. Hilty, Union Carbide Metals Co.

"Problems of the Patent Office," D. Ladd, Commissioner of Patents

"Government Responsibilities," B. W. Atkinson, National Science Foundation

SNT Session: Ultrasonic Research and Standards

"Ultrasonic Weldment Inspections Cur-



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PROGRAM

rently in Use," F. C. Park, Union Carbide Chemicals Co.

"Frequency Dependent Effects in Ultrasonic Pulse Flaw Detection," J. E. Bobbin, E. A. Henry, Branson Instruments, Inc.

"Effects of Test Speed on Ultrasonic Flaw Detection Reliability," J. P. Bacon, Elion Ultrasonics, Inc.

"Immersed Ultrasonic Resonance Gaging," R. V. Harris, Branson Instruments, Inc.

"Ultrasonic Standards for Steel Plate," P. Dempsey, U. S. Steel Corp.

"Licensing and Proper Use of Isotopes in Industry, Panel Discussion," Moderator: G. H. Tenney, Los Alamos Scientific Lab.

Afternoon Program:

SNT Session: General Application of Nondestructive Testing

"Radiography of Beryllium," H. R. Splettstosser, Eastman Kodak Co.

"Use of Portable Shear Tester for Testing Adhesive Bonded Joints," C. F. Herndon, Convair

"Radiography of Steel With 10-Mev Linac," S. A. Wenk, Varian Associates

"Relation of Fluorescent Penetrant Color to Ambient Illumination," J. Kastner, Picker X-Ray Corp.

"Evaluation of Penetrant Systems," B. Graham, Magnaflux Corp.

"Development of Standards for Eddy Current and Ultrasonic Testing of Tubing and Pipe," H. J. Bowman, Trent Tube Co.

SHOW EXHIBITORS

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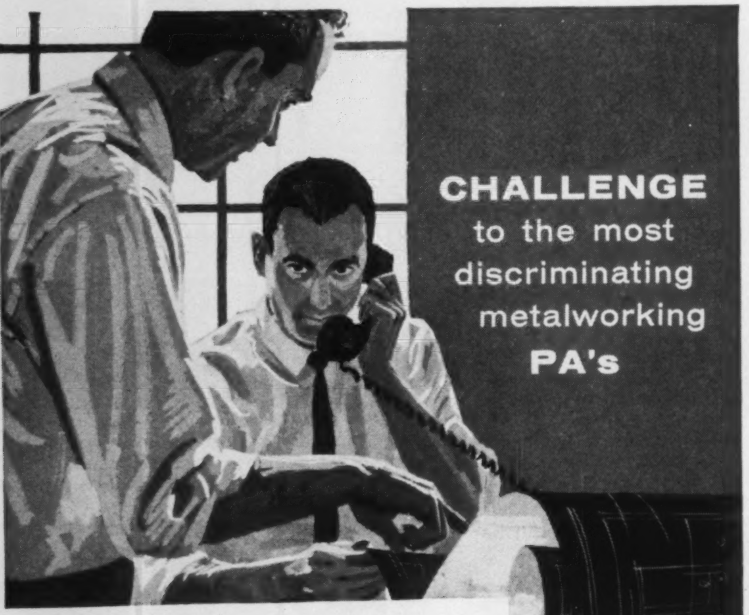
Ajax Electric Co.	452
Ajem Laboratories, Inc.	1048
Aldridge Industrial Oils, Inc.	415
Allen Aircraft Products, Inc.	457
Alloy Metal Abrasive Co.	1151
Armour Alliance Industries	1251
Ashland Oil & Refining Co.	513
Autosonics, Inc.	409
Balcrank, Inc.	225
Binks Mfg. Co.	138
G. S. Blakeslee & Co.	1029
Branson Instruments, Inc	838
Centri-Spray Corp.	1048
Despatch Oven Co.	714
Dow Chemical Co.	320
E. I. du Pont De Nemours & Co.	1028
Electric Steam Products, Inc.	316
Engelhard Industries	1150
Globe Industries, Inc. Vibrodyne and Supermet Div.	1229
Gray Company, Inc.	333
Heil Process Equipment Corp.	411
E. F. Houghton & Co.	621
R. O. Hull & Co., Inc.	162
Kolene Corp.	420
Manpro Corp.	1238
Merit Products, Inc.	1235
Metalwash Machinery Corp.	1220
Minnesota Mining & Mfg. Co.	828
Mobile Oil Co.	1130
Murray-Way Corp.	1200
Nordson Corp.	216
Oakite Products, Inc.	1138
Panghorn Corp.	620
Pennsalt Chemicals Corp.	310
Phillips Mfg. Co.	1052
Progressive Chemical & Equipment Corp.	920
Ransburg Electro-Coating Corp.	171
Roto-Finish Ransohoff Co.	1120
Southwestern Engineering Co.	814
Steco Corporation	255
Turco Products, Inc.	421
Univertical Corporation	1225
Vapor Blast Mfg. Co.	212
Waldron-Hartig Div. Midland-Ross Corp.	672
Waukee Engineering Co.	137
Weltronic Co.	1072
Westinghouse Electric Corp.	529
Wheel Trueing Tool Co.	350
S. S. White Industrial Div.	1034
Wyandotte Chemical Corp.	1127

INDUSTRIAL HEATING

Exhibitor	Booth
Ajax Electric Co.	452
Ajax Magnethermic Corp.	346
American Gas Furnace Co.	821
Anderson Engineering	1207
Arcweld Mfg. Co.	356
Ashworth Bros., Inc.	463
Audubon Metalwove Belt Div. Manganese Steel Forge Co.	633
Cincinnati Sub-Zero Products	1033



from the makers of

MILWAUKEE WROT WASHERS

In this difficult economy, nobody has time for sales gimmicks or jests. So this is neither. We simply want to *prove* to you, Mr. PA, and to your cohorts in Administration, Engineering and Production, that *Milwaukee Wrot Washers* are your best buy.

Washers are important products . . . particularly when unusual types, produced to precise standards, are wanted "yesterday" for important jobs.

This is our proposal: Next time you run into a REAL PROBLEM with washers or fasteners, get in touch with us. Bet you we can solve it, pronto. You be the judge!

P.S. Of course, we also appreciate no-strain orders for ordinary types of washers, which our 129,000+ washer dies can probably handle easily.

WW/6/6061/MP

PURCHASING PERSONNEL . . . Free samples available. Request on your letterhead, mentioning types of washers your company uses most frequently. Or write for Washers and Stampings Catalog 40-B.

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SINCE 1887
WROUGHT WASHER MFG. CO.
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WORLD'S LARGEST PRODUCER OF WASHERS

WROUGHT
WASHER

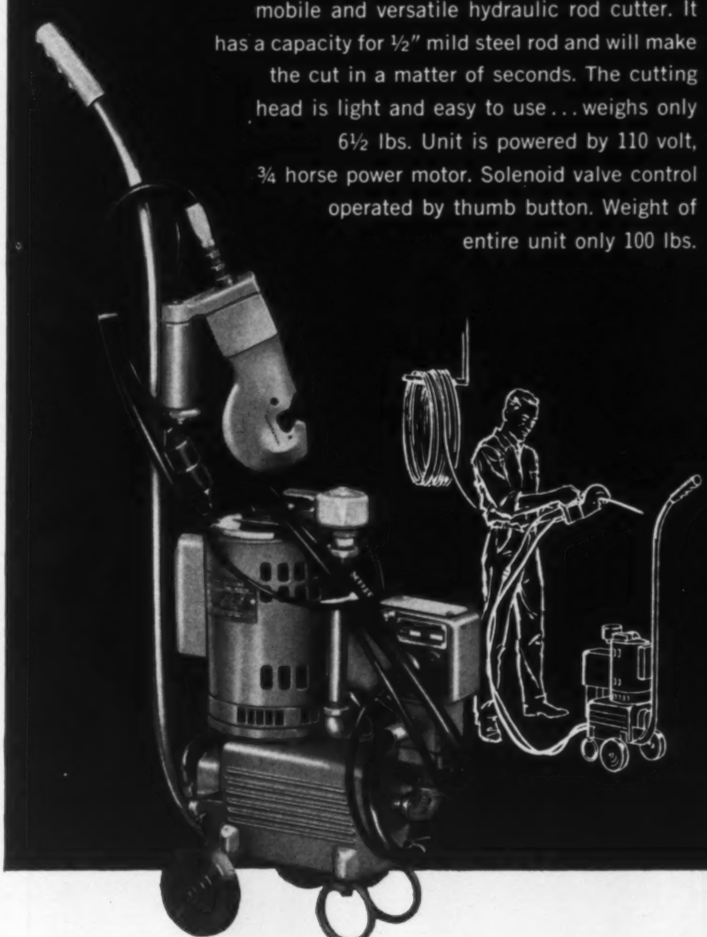
Commercial Steel Treating Corp.	1007
Daystrom, Inc., Weston Instrument Div.	339
Despatch Oven Co.	714
Detroit Edison Co.	1234
Dry Clime Lamp Corp.	1056
Eclipse Fuel Engineering Co.	1073
Electric Furnace Co.	306
Electric Steam Products, Inc.	316
Electro-Alloys Div. American Brake Shoe Co.	428
Engelhard Industries	1150
Exomet, Inc.	934
General Alloys	603
General Electric Co.	262
Harper Electric Furnace Corp.	433
Harris Mfg. Co., Inc.	1215
Harrison Engineering Corp.	721
C. I. Hayes, Inc.	938
Heil Process Equipment Corp.	411
Hevi-Duty Electric Co., Div. of Basic Products Corp.	151
Holcroft & Co.	353
E. F. Houghton & Co.	621
Inductotherm Corp.	921
Industrial Furnace Co., Div. of AAA Machinery & Equip. Co.	607
Ipsen Industries, Inc.	161
Kolene Corp.	420
Lake Chemical Co.	1162
Latronic Corp.	1135
Leeds & Northrup Co.	639
Lepel High Frequency Laboratories	962
Lindberg Engineering Co.	706
Marquardt Corp.	738
Joe Martin Co., Inc.	221
Metal Treating Institute	515
Midland-Ross Corp.	672
National Induction Heating	1051
Ohio Crankshaft Co., Tocco Div.	238
Park Chemical Co.	907
Pyrometer Instrument Co., Inc.	431
J. O. Ross Engineering Div., Midland-Ross Corp.	672
Selas Corp. of America	872
Sentry Co.	930
Spencer Turbine Co.	215
Sunbeam Corp.	721
Surface Combustion Div. Midland-Ross Corp.	672
Tempil Corp.	928
Upton Electric Furnace Co.	909
Waukee Engineering Co., Inc.	137
Westinghouse Electric Corp.	529
West Instrument Corp.	412
Wheelco Instruments Div., Barber-Colman Co.	1134
Lee Wilson Engineering Co.	332

NONFERROUS

Exhibitor	Booth
Al-Fin Corp.	1011
Alloy Metal Abrasive Co.	1151
Aluminum Co. of America	528
Beryllium Corp.	963
J. Bishop & Co., Platinum Works	438
Canada-Dept. of Trade & Commerce	210
Central Foundry Div., General Motors Corp.	252
Cobalt Information Center	539
Cooper Metallurgical Associates	229

NEW FAST PORTABLE HYDRAULIC ROD CUTTER

IDEAL FOR TAKING ROD SAMPLES AND OTHER CUTTING JOBS. Here is an exceptionally mobile and versatile hydraulic rod cutter. It has a capacity for ½" mild steel rod and will make the cut in a matter of seconds. The cutting head is light and easy to use... weighs only 6½ lbs. Unit is powered by 110 volt, ¾ horse power motor. Solenoid valve control operated by thumb button. Weight of entire unit only 100 lbs.



MANCO offers a complete line of hydraulic cutting tools, punches, rod straighteners. Write for Catalog.

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Quality
and
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Use

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Connecticut Mall. Castings Co., New Haven 6
Alloy Foundries Division, The Eastern Co., Naugatuck

ILLINOIS

Central Fdry. Div., Gen. Motors, Danville
Chicago Malleable Castings Co., Chicago 43
Moline Iron Works, Moline
Moline Malleable Iron Co., St. Charles
National Castings Co., Cicero 50
Peoria Malleable Castings Co., Peoria 1
Wagner Castings Company, Decatur

INDIANA

Albion Malleable Iron Company, Muncie Division, Muncie
Link-Belt Company, Indianapolis 6
National Castings Co., Indianapolis 22

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Iowa Malleable Iron Co., Fairfield

MASSACHUSETTS

Belcher Malleable Iron Co., Easton

MICHIGAN

Albion Malleable Iron Co., Albion
Auto Specialties Mfg. Co., Saint Joseph
Cadillac Malleable Iron Co., Cadillac
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MINNESOTA

Northern Malleable Iron Co., St. Paul 6

MISSISSIPPI

Mississippi Malleable Iron Co., Meridian

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Laconia Malleable Iron Co., Laconia

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Acme Steel & Mall. Iron Works, Buffalo 7
Frazer & Jones Company Division The Eastern Co., Solvay
Oriskany Malleable Iron Co., Inc., Oriskany
Westmoreland Mall. Iron Co., Westmoreland

OHIO

American Malleable Castings Co., Marion
Central Fdry. Div., Gen. Motors, Defiance
Dayton Mall. Iron Co., Ironton Div., Ironton
Dayton Mall. Iron Co., Ohio Mall. Div., Columbus 16
National Castings Co., Cleveland 6

PENNSYLVANIA

Buck Iron Company, Inc., Philadelphia 22
Erie Malleable Iron Co., Erie
Lancaster Malleable Castings Co., Lancaster
Lehigh Foundries Company, Easton
Meadville Malleable Iron Co., Meadville
Pennsylvania Malleable Iron Corp., Lancaster

TEXAS

Texas Foundries, Inc., Lufkin

WEST VIRGINIA

West Virginia Mall. Iron Co., Point Pleasant

WISCONSIN

Belle City Malleable Iron Co., Racine
Chain Belt Company, Milwaukee 1
Federal Malleable Company, Inc., West Allis 14
Kirsh Foundry Inc., Beaver Dam
Lakeside Malleable Castings Co., Racine
Milwaukee Malleable & Grey Iron Works, Milwaukee 46

These companies are members of the Malleable Castings Council

EXHIBITORS

Exhibitor	Booth
Copper and Brass Sales, Inc.	830
Curtiss-Wright Corp. Metals Processing Division	1208
Wilbur B. Driver Co.	314
Exomet, Inc.	934
General Electric Co. Metallurgical Products Dept.	262
Harrison Engineering Corp.	157
Howe Sound Co.	862
Industrial Furnace Co., Div. of AAA Machinery & Equipment Co.	607
International Nickel Co.	472
Kasle Steel Corp.	453
Kawecki Chemical Co.	1249
Kester Solder Co.	231
Nuclear Materials & Equipment Corp.	455
C. A. Roberts Co.	1211
Stauffer Metals Co.	456
Superior Tube Co.	1032
Tin Research Institute, Inc.	537
Union Carbide Corp.	127
Union Carbide Metals Co., Div. of Union Carbide Corp.	127
Univertical Corp.	1225
Upton Electric Furnace Co.	909
Vanadium Corp. of America	338
Westinghouse Electric Corp.	529

NONMETALLIC

Exhibitor	Booth
Alloy Surfaces Co., Inc.	808
Allvac Metals	734
Aluminum Co. of America	528
Audobon Metalwove Belt Division	633
Beryllium Corp.	963
Cam-Lok Div., Empire Products, Inc.	1055
Canada-Dept. of Trade & Commerce	210
W. M. Chace Co.	227
Despatch Oven Co.	714
Detroit Hinge Mfg. Co.	1257
Electric Furnace Co.	306
Engelhard Industries	1150
Furane Plastics, Inc.	1227
General Electric Co., Lamp Metals and Components Dept.	262
Heil Process Equipment Corp.	411
Howe Sound Co.	862
Kasle Steel Corp.	453
Mettler Instrument Corp.	1255
National Carbon Co. Div. of Union Carbide Corp.	215
Spencer Turbine Co.	215
Stauffer Metals Co.	456
Steco Corp.	255
Tempil Corp.	928
Union Carbide Corp.	127

NUCLEAR

Exhibitor	Booth
Al-Fin Corp.	1011
Allegheny Ludlum Steel Corp.	572
Allvac Metals	734
Arcweld Mfg. Co.	356
Beryllium Corp.	963
J. Bishop & Co., Platinum Works	438
Budd Co.	220
Chromalloy Corp.	248
Cooper Metallurgical Associates	229
Harper Electric Furnace Corp.	433
International Nickel Co.	472
Mettler Instrument Corp.	1255
National Carbon Co., Div. of Union Carbide Corp.	127
Nuclear Materials & Equipment Corp.	455
Picker X-Ray Corp.	1221
Stauffer Metals Co.	456
F. J. Stokes Corp.	268
Super Alloys Forge	1010
Tempil Corp.	928
Union Carbide Corp.	127
Westinghouse Electric Corp.	529

PARTS, FORMS, SHAPES FOR DESIGN AND APPLICATION

Exhibitor	Booth
Alloy Products Corp.	935
Aluminum Co. of America	528
American Machine & Foundry Co.	711
Audobon Metalwove Belt Div.	633
Avon Tube Div., Higbie Mfg. Co.	834
Babcock & Wilcox Co. Tubular Products Div.	462
J. Bishop & Co., Platinum Works	438
Canada-Dept. of Trade & Commerce	210
Centri-Spray Corp.	1048
W. M. Chace Co.	227
Cobalt Information Center	539
Copper and Brass Sales	830
Detroit Hinge Mfg. Co.	1257
Electro Alloys Div., American Brake Shoe Co.	428
General Alloys	603
Globe Industries, Inc., Vibrodyne & Supermet Div.	1229
Hardis Laboratories, Inc.	1115
Heli-Coil Corp.	434
Howe Sound Co.	862
Lapeer Mfg. Co.	1039
Marquardt Corp.	738
Merrill Brothers	910
National Carbon Co., Div. of Union Carbide Corp.	127
New Hermes Engraving Machine Corp.	917
Precision Extrusions, Inc.	1131
J. A. Richards Co.	1263
Super Alloys Forge	1010
Union Carbide Corp.	127
Univertical Corp.	1225
Wall Colmonoy Corp.	935
Webb Forging Co.	956
Westinghouse Electric Corp.	529
Will-O-Hill Industries, Inc.	1253

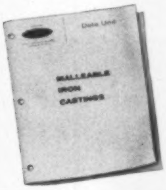
STEEL

Exhibitor	Booth
ACIPCO Steel Products Div., American Cast Iron Pipe Co.	1230
Al-Fin Corp.	1011

Continued on P. 197

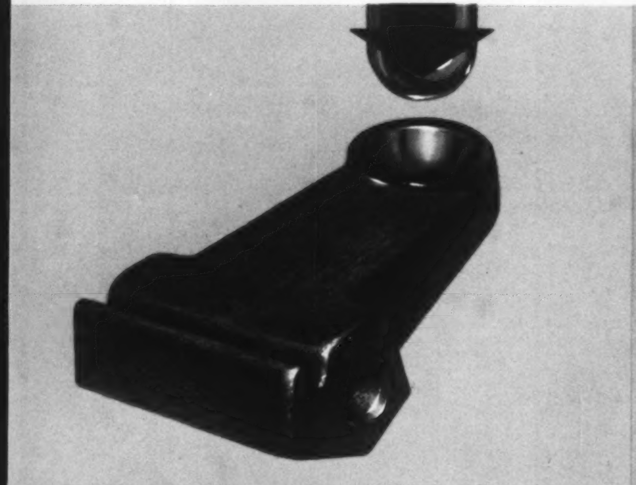
Post-Forming: New Way to Bigger Savings with Malleable Castings

The ductility of Malleable iron castings permits use of high-speed forming techniques to finish Malleable parts at lower cost. Take advantage of the versatility you get only with ferritic and pearlitic Malleable castings. For a fuller understanding of how Malleable can help you, call any producer that displays this symbol—

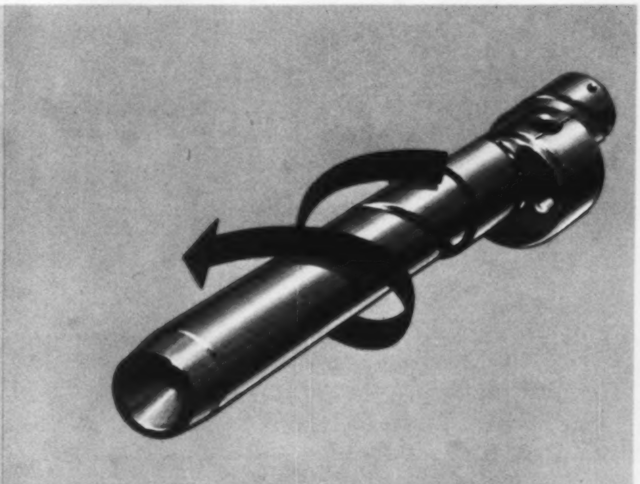


Free Folder describing these techniques is available for your use. Just ask any member of the Malleable Castings Council for Data Unit No. 116, or write to Malleable Castings Council, Union Commerce Building, Cleveland 14, Ohio.

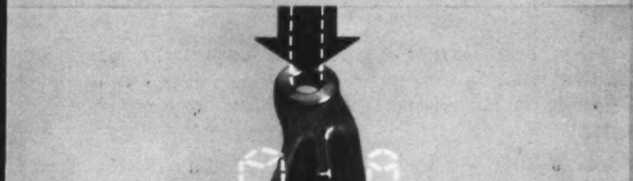
MEMBER
MALLEABLE
CASTINGS COUNCIL



Hot Form It—Hot coining this Malleable transmission part reduces finished cost . . . eliminates three cutting operations required by the previously used steel part.

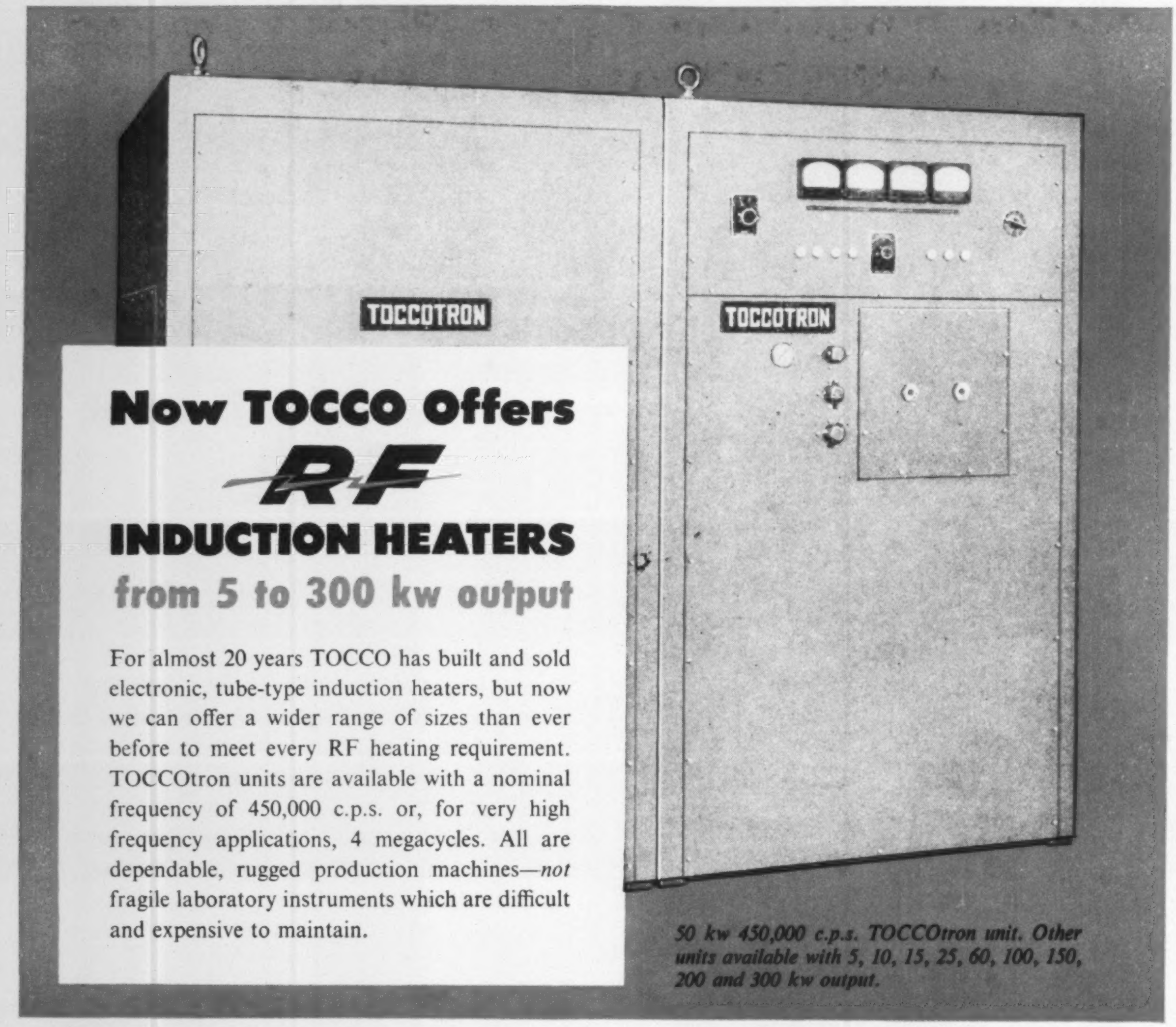


Roll It—Oil grooves in lawnmower crankshafts and splines in compressor crankshafts are just two of many places where rolling proves more economical than machining.



Punch It—Holes with diameters greater than the thickness of the metal can be punched in Malleable. Two round holes and a square hole are punched simultaneously in this idler arm.

Spin It—Malleable's ductility permits the sleeve and end disc in this ball joint to be held in place by spinning the Malleable housing into a strong, permanent flange.



Now TOCCO Offers RF INDUCTION HEATERS

from 5 to 300 kw output

For almost 20 years TOCCO has built and sold electronic, tube-type induction heaters, but now we can offer a wider range of sizes than ever before to meet every RF heating requirement. TOCCOtron units are available with a nominal frequency of 450,000 c.p.s. or, for very high frequency applications, 4 megacycles. All are dependable, rugged production machines—*not* fragile laboratory instruments which are difficult and expensive to maintain.

50 kw 450,000 c.p.s. TOCCOtron unit. Other units available with 5, 10, 15, 25, 60, 100, 150, 200 and 300 kw output.

Check these advantages:

- ☐ The industrial heavy-gauge steel cabinet which completely encloses all high potential circuits preventing radiation interference and personnel hazards.
- ☐ Meters in all sensitive circuits to enable the user to obtain the maximum output and efficiency.
- ☐ High KVA tank circuits and adjustable plate voltage, grid bias and grid drive controls where desirable, allow easy matching to all loads.
- ☐ Externally mounted circuit breaker and disconnect located so that it is easily accessible. JIC type enclosure which separates all control components from the high voltage circuits.
- ☐ Integral water systems available in most models—saves floor space and water consumption.
- ☐ Gasketed, lockable doors allow easy accessibility to all components. JIC type enclosure cooled with air to water heat exchanger.

Because TOCCO makes both audio frequency equipment (motor-generator sets) and radio frequency equipment (electronic tube-type units as shown), you can always count on a completely unbiased equipment recommendation—the right equipment for your particular heating job.

TOCCO

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Mail Coupon Today!

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F.C.C. Certification: All TOCCOtrons are certified to meet the requirements of F.C.C. Rules and Regulations, Part 18.

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Dept. A-10, Cleveland 5, Ohio

Please send literature describing TOCCOtron Radio Frequency Induction Heating Equipment.

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Position________________________

Company________________________

Address________________________

City____________ **Zone**____ **State**________

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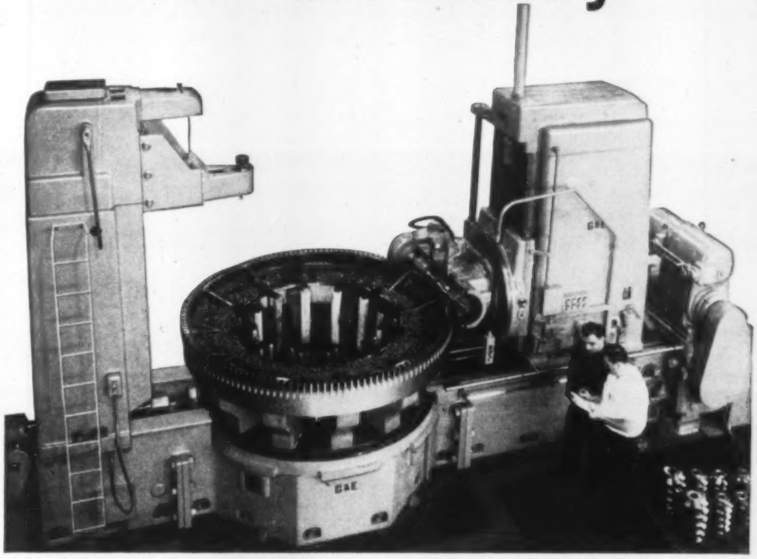
Alloy Metal Abrasive Co.	1151
Allvac Metals	734
Avon Tube Div., Higbie Mfg. Co.	834
Babcock & Wilcox Co. Tubular Products Div.	462
Canada-Dept. of Trade & Commerce	210
Central Foundry Div., General Motors Corp.	252
W. M. Chace Co.	227
Chromalloy Corp.	248
Cooper Metallurgical Associates	229
Copperweld Steel Co., Aristoloy Steel Div.	448
Curtiss-Wright Corp., Metals Processing Div.	1208
Detroit Hinge Mfg. Co.	1257
Wilbur B. Driver Co.	314
Electro-Alloys Div., American Brake Shoe Co.	428
Exomet, Inc.	934
General Alloys Co.	603
Gleason Works	154
Great Lakes Steel Corp.	772
Harrison Engineering Corp.	157
Howe Sound Co.	862
Industrial Furnace Co., Div. of AAA Machinery & Equipment Co.	607
International Nickel Co.	472
Jones & Laughlin Steel Corp., Stainless & Strip Div.	839
Korhumel Steel & Aluminum Co.	948
Laboratory Equipment Corp.	1053
LaSalle Steel Co.	730
Leeds & Northrup Co.	639
Lynchburg Foundry Co.	363
McLouth Steel Corp.	850
Merrill Brothers	910
Republic Steel Corp.	638
C. A. Roberts Co.	1211
Service Steel Div., Van Pelt Corp.	532
Sharon Steel Corp.	1171
Superior Tube Co.	1032
Timken Roller Bearing Co., Steel & Tube Div.	739
Ulbrich Stainless Steels, Inc.	538
United States Steel Corp.	630
U. S. Pipe and Foundry Co., Steel and Tubes Div.	1262
Vanadium-Alloys Steel Co.	557
Vanadium Corp. of America	338
Westinghouse Electric Corp.	529
Youngstown Sheet & Tube Co.	968

PRODUCTION AND CASTING

Exhibitor	Booth
Al-Fin Corp.	1011
Aluminum Co. of America	528
American Cast Iron Pipe Co.	1230
American Gas Furnace	821
Artco, Inc.	160
Atkins Saw, Div. of Borg Warner	1233
Canada-Dept. of Trade & Commerce	210

New Production Capacity For Fast Delivery



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for a wide range of industrial applications

Gears which must operate smoothly and without vibration at higher speeds and under greater loads must correspondingly be more accurate in tooth profile and spacing.

H & S Generated Gears answer these demands.

Offering the same high-quality standards which characterize the complete H & S Gear line, production capacities for large generated Spur, Helical and Hobbed-Herringbone Gears are now available in the following dimensions:

Up to 80″ outside diameter at 1 DP
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Face widths up to 42″, depending on helix angle

Send your specifications, or let our technical staff make recommendations. H & S specializes in fast production of quality industrial Gearing and Speed Reducers to meet your custom requirements.

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Commercial Steel Treating Corp.	1007
Curtiss-Wright Corp.	1208
Hevi-Duty Electric Co., Div. of Basic Products Corp.	151
Hoffman Industries, Inc.	1155
E. F. Houghton & Co.	621
Small AC Motor & Generator Dept., General Electric Co.	262
Howe Sound Co.	862
Inductotherm Corp.	921
Industrial Furnace Co., Div. of AAA Machinery & Equip. Co.	607
Leeds & Northrup Co.	639
Marquette Div., Curtiss-Wright Corp.	1208
Martin Engineering Co.	1059
Metals Processing Div., Curtiss-Wright Corp.	1208
National Carbon Co., Div. of Union Carbide Corp.	127
Pangborn Corp.	620
Pyrometer Instrument Co., Inc.	431
Relton Corp.	1259
Roto-Finish Ransoff Co.	1120
Spencer Turbine Co.	215
Stauffer Metals Co.	456
F. J. Stokes Corp.	268
Surface Combustion Div., Midland-Ross Corp.	672
Union Carbine Corp.	127
Union Carbide Metals Co., Div. of Union Carbide Corp.	127
United Clamping Mfg.	1009
Upton Electric Furnace Co.	909
Wall Colmonoy Corp.	933
Webb Forging Co.	956

SOCIETIES AND ASSOCIATIONS

Exhibitor	Booth
American Society for Metals	650
Bureau of Foreign Commerce	120
Metals Engineering Institute	650
Metal Treating Institute	515
Small Business Administration	150
Social Security Administration	1012
Special Libraries Association	256
Tire Research Institute, Inc.	537
U. S. Department of Commerce	120

TESTING, INSPECTION, CONTROL AND RESEARCH

Exhibitor	Booth
Ajem Laboratories, Inc.	1048
Alloy Metal Abrasive Co.	1151
Alnor Instrument Div., Illinois Testing Laboratory	915
Alpha Electric Refrig. Co.	259
American Cystoscope Makers	1112
American Optical Co., Instrument Div.	954
Arcweld Mfg. Co.	356
Assembly Products, Inc.	1008
Baird-Atomic, Inc.	253
Bausch & Lomb, Inc.	232
Branson Instruments, Inc.	838
Brinkmann Instruments, Inc.	1129
Budd Co.	220
Buehler Ltd.	520
Canada-Dept. of Trade & Commerce	210
Cavitron Equipment Corp.	610
Centri-Spray Corp.	1048
Cincinnati Sub-Zero Products	1033
Collins Microflat Co., Inc.	1057
Curtiss-Wright Corp.	1208
Daystrom, Inc., Weston Instrument Div.	339
Detroit Hinge Mfg. Co.	1257
Detroit Testing Machine Co.	806
Elion Ultrasonics, Inc.	1063
William J. Hacker & Co.	1020
Hardic Laboratories, Inc.	1115
Harris Mfg. Co.	1215
Howe Sound Co.	862
Instron Engineering Corp.	1021
Instrument Development Laboratories	1153
King Tester Corp.	914
Laboratory Equipment Corp.	1053
Latronics Corp.	1135
Leeds & Northrup Co.	639
E. Leitz, Inc.	1049
Magnaflux Corp.	368
Magnetic Analysis Corp.	1015
Markal Co.	1162
Marquardt Corp.	738
Metal Treating Institute	515
Mettler Instrument Corp.	1255

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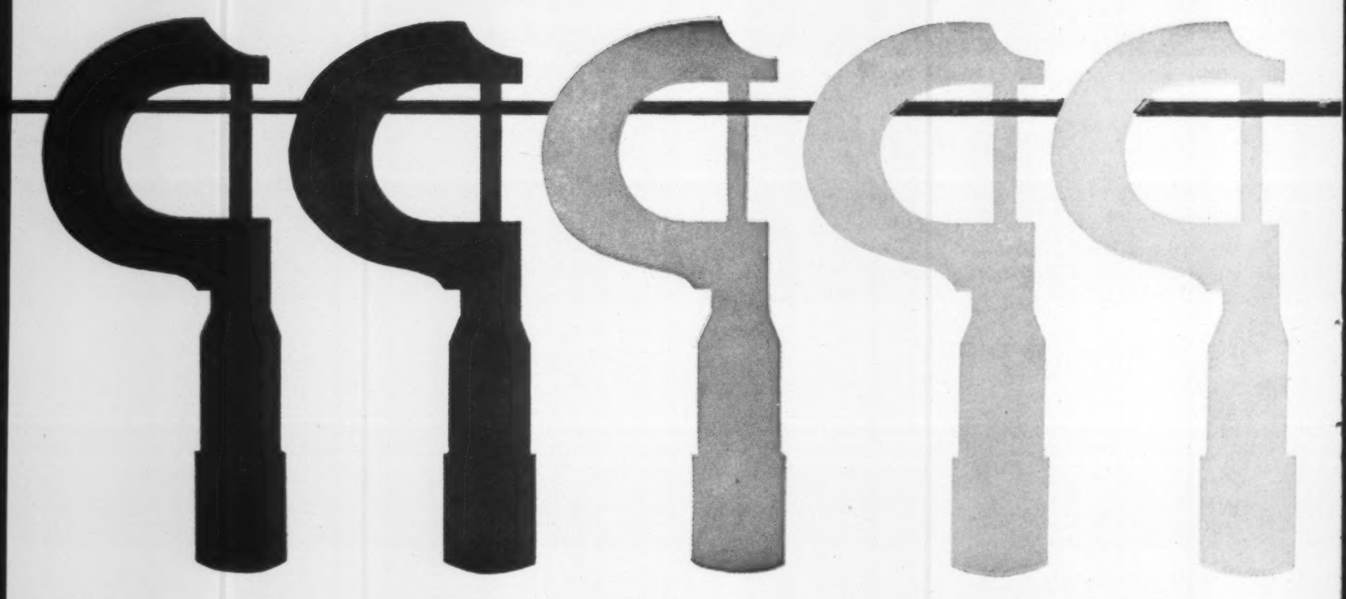
Now—abrasive belt machining grinds sheets, strip, and



Micrometrical Mfg. Co.	239
Mine Safety Appliances Co.	811
Minneapolis-Honeywell Regulator	820
National Induction Heating	1051
Nuclear Materials & Equipment Corp.	455
Olsen Scientific Instruments	217
Tinius Olsen Testing Machine Co.	329
Perken-Elmer Corp.	1157
Picker X-Ray Corp.	1221
Princeton Div., Curtiss-Wright Corp.	1208
Pyrometer Instrument Co.	431
Radiation Electronics Co., Comptometer Corp.	929
Research & Control Instruments	1133
Riehle Testing Machine Div. American Machine & Metals	829&429
Sieburg Industries, Inc.	414
Sperry Products Co.	1108
Steel City Testing Machines Div. American Machine & Metals	429
F. J. Stokes Corp.	268
Torsion Balance Div., American Machine & Metals	257
Turco Products, Inc.	421
United Clamp Mfg. Co.	1009
Unitron Instrument Co.	508
Weltronic Co.	1072
West Instrument Corp.	412
Westinghouse Electric Corp.	529
Wheelco Instruments Div., Barber-Colman Co.	1134
S. S. White Industrial Div.	1934
Wiedemann Machine Co.	521
Wilson Mechanical Instruments	952

TOOL MATERIALS, CUTTING AND FORMING EQUIPMENT

Exhibitor	Booth
Allegheny Ludlum Steel Corp.	572
Allison-Campbell Div. American Chain & Cable Co.	514
American Pullmax Co., Inc.	349
Artco, Inc.	160
Beaver Pipe Tools, Inc.	906
Canada—Dept. of Trade & Commerce	210
Cavitron Equipment Corp.	610
Clearing Div. U. S. Industries	1244
Cobalt Information Center	539
Cooper Metallurgical Associates	229
Curtiss-Wright Corp.	1208
Dake Corp.	168
Elox. Corp. of Michigan	961
General Electric Co. Metallurgical Products Dept.	262
Hamilton-Electrona, Inc.	232
Jiffy Disintegrators, Inc.	211
Lennox Tool & Machine Builders	810
Linde Company Div. of Union Carbide	127
Modern Mfg. Co.	219
New Hermes Engraving Machine Corp.	917
J. A. Richards Co.	1263
Super Alloy Forge Inc.	1010
Union Carbide Corp.	127
Wales Strippit, Inc.	130
Webb Forging Co.	956
Wells Mfg. Corp.	1111
Wheel Trueing Tool Co.	350
Wickman Products Corp.	1113

WELDING AND JOINING

Exhibitor	Booth
Aerobraze Corp.	908
American Gas Furnace Co.	821
American Machine & Foundry Co.	711
American Pullmax Co., Inc.	349
Cam-Lok Div. Empire Products, Inc.	1055
Canada—Dept. of Trade & Commerce	210
Copper and Brass Sales, Inc.	830
Exomet, Inc.	934
Gregory Industries, Inc.	148
Hamilton-Electrona, Inc.	232
Hobart Brothers Co.	720
Howe Sound Co.	862
Lake Chemicals Co.	1162
Lapeer Mfg. Co.	1039
Lepel High Frequency Labs.	962
Lincoln Electric Co.	868
Linde Co. Div. of Union Carbide Corp.	127
Merrill Brothers	910
Motor City Tool & Die	1014
Nelson Stud Welding Div.	148
A. O. Smith Corp.	563
United Clamp Mfg. Co.	1009
Wall Colmonoy Corp.	933
Weltronic Co.	1072
Westinghouse Electric Corp.	529

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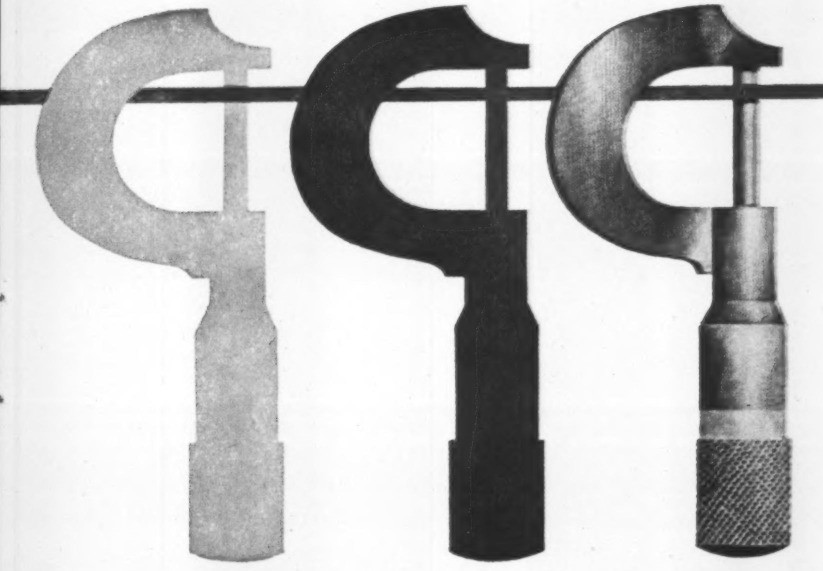
stainless steel coil to precision tolerances

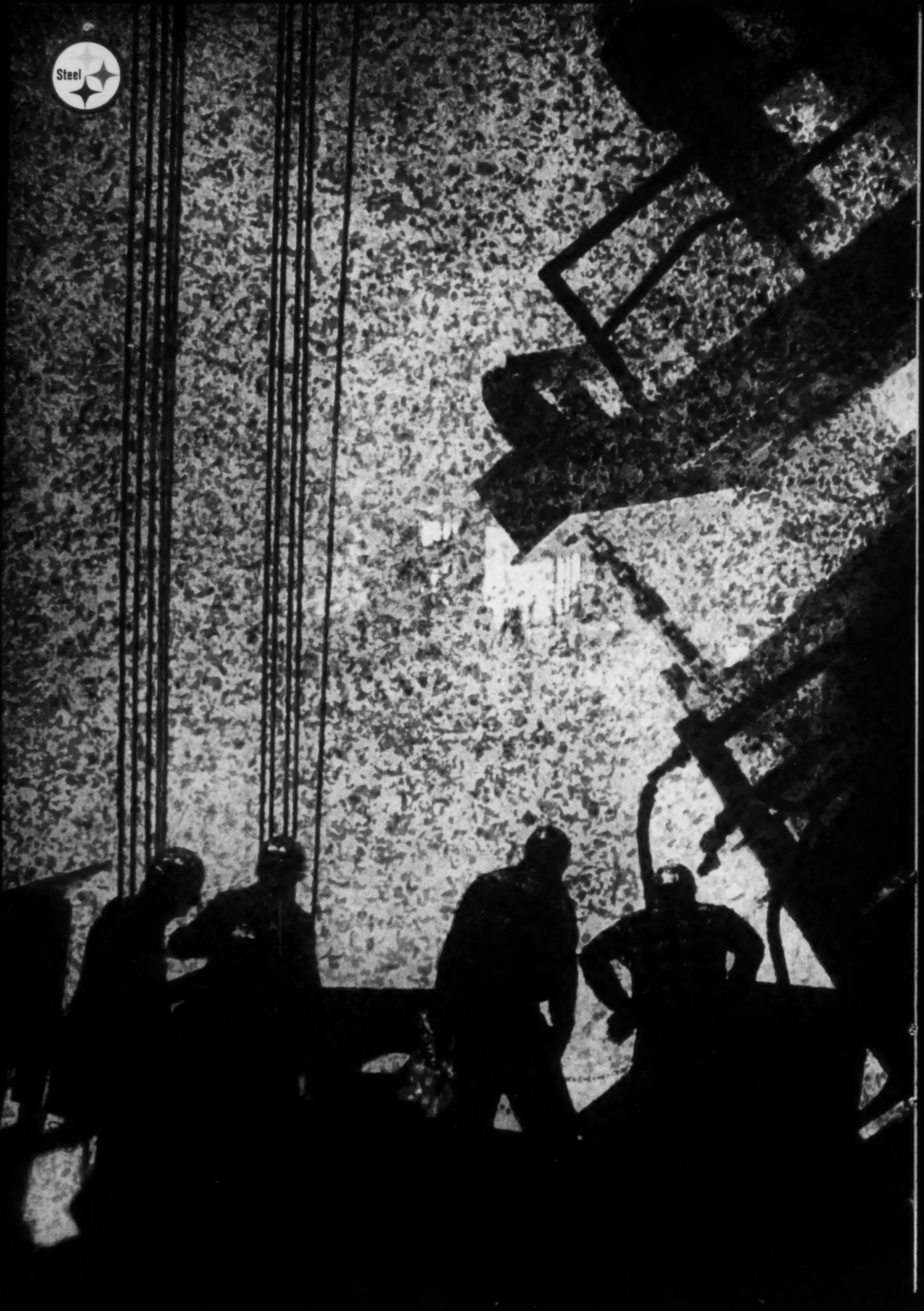


BEHR-MANNING ABRASIVE BELTS, used on a wide variety of new machines, are providing industry with high-speed precision grinding that reduces production costs, makes better materials available for fabrication, and solves fabrication problems themselves.

Can abrasive machining cut your costs, make your products more widely applicable? Very probably. And we'll be happy to help you find out. It's a fact that Behr-Manning devotes more men, facilities and resources to coated abrasive research and development than anyone else in the world. And brings you the coated abrasives you need where and when you need them.

BEHR-MANNING CO.,
Troy, N. Y., a division
of Norton Company.

BEHR-MANNING
Abrasive Engineering


Steel

PHOTOGRAPH BY PAUL WELLER

THE IMPELLING URGE

Of a steelmaking specialist. To be a step ahead. In equipment. In versatility ■ Tilt the mammoth electric furnace. Pour the molten stream. Steels for bridges, missiles, refineries and a host of other industrial uses. From a modern electric furnace comes the vast variety of special-duty steels essential to the skilled builders of such vital projects ■ The urge for versatility and product range is a characteristic long associated with Lukens in the making of plate steels. Carbon steels by the thousands of tons. Special-duty clad and alloy steels. Armor steels. Heads and steel plate shapes. It is one of many characteristics that make Lukens—

THE SPECIALIST
IN PLATE STEELS

LUKENS
L
STEEL

COATESVILLE, PA.

Linde "Total Gas Technology" guarantees your oxygen supply...

Lancing in electric furnaces calls for a dependable supply of oxygen.

WHERE BACK-UP MEANS GO

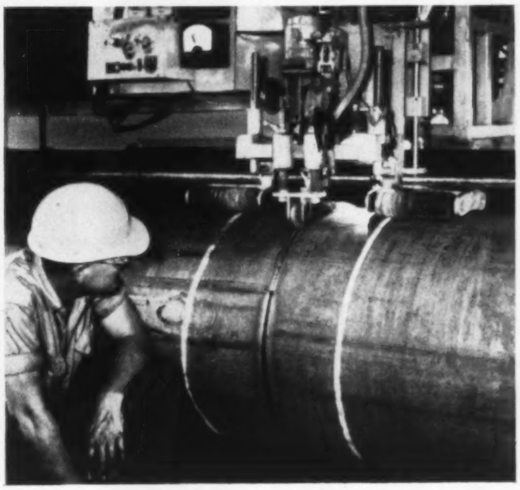
Today's steel mill cannot live without oxygen. That makes back-up of supply vital. Supplemental oxygen is needed, too—for peaks, for emergency use, for full-scale tests. ✦ Every LINDE customer is backed up by a supply system that includes more than 90 liquid oxygen producing, storage, and distribution plants, and a fleet of railroad tank cars and tank trucks. Total liquid storage capacity is over 30,000 tons at LINDE plants, with tens of thousands of tons more in the field. ✦ But this is only part of "Total Gas Technology"—LINDE equipment, processes, service, research; all are helping steel sell by reducing the cost of production *and* fabrication. *Note two more examples at right.*

"LINDE," "UNION CARBIDE," "DRIOX," "OXWELD," AND "UNIONMELT," ARE REGISTERED TRADE MARKS OF UNION CARBIDE CORPORATION, AND USED BY ITS DIVISION, LINDE COMPANY, 270 PARK AVENUE, NEW YORK 17, N. Y.

Steel costs lowered by modern technology

New OXWELD C-66 cutting torch—cuts up to 30 in. with natural gas as fuel. Field operations have shown savings up to 15% in operating costs.

UNIONMELT Submerged Arc welding "double-joints" 24-in. diameter steel pipe into 60-ft. lengths at the pipe mill, speeds major pipeline construction.



FORWARD

LINDE COMPANY

UNION CARBIDE

NEW BOOKS

"Phase Diagrams of Metallic Systems" is a series of reports by Russian researchers. The reports—first published in the USSR Academy of Sciences' Journal of Inorganic Chemistry—are now available in English. In May 1957, Soviet scientists met in Moscow to discuss the subject. In 1958, the "Journal" devoted an entire issue to 34 of the research papers presented at the Moscow conference. Typical papers in this collection include discussions of: The Phase Diagram as an Expression of Interatomic Interaction; Theory of Phase Diagrams of Multicomponent Systems; Study of Alloys of the Ternary System Nickel-Aluminum-Tungsten; Phase Diagrams of Alloys of Lanthanum with Cerium, and Lanthanum with Calcium; and Phase Diagrams of Certain Magnesium Base Systems. 426 pp., Office of Technical Services, Business and Defense Services Administration, U. S. Dept. of Commerce, Washington 25, D. C.

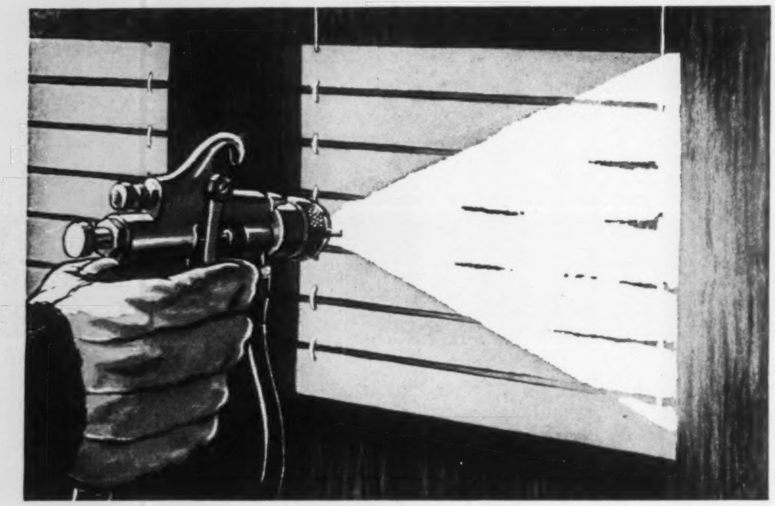
"Directory of Steel Foundries (1961-1962)" covers the U. S., Canada and Mexico. Published biennially, this 6 x 9-in. volume lists steel foundries, their officers and directors, types of and sizes of castings produced, processes employed and types of melting and heat-treating equipment used. In addition, the "Directory" covers testing facilities, number of employees and monthly capacities. Published in a limited edition, the reference also contains a listing of officers, directors and committees of the Steel Founders' Society plus an index to steel foundries by states. 270 pp, $15.00, Steel Founders' Society of America, 606 Terminal Tower, Cleveland 13, Ohio.

"Cold Forging of Steel," by Dr.-Ing. Heinz D. Feldmann, is the first attempt made to provide a general statement of the process of cold forging. In doing so, the text takes advantage of the most up-to-date knowledge and experience in the field. The volume does double duty as a textbook and a practical production manual. For the student, there is the basic theory, supported by formulas and examples of theory applied in practice. For the practicing engineer and manufacturer, the remaining sections of the book introduce the practice of cold forging and show how it fits into today's industrial world. Although cold forging is a process that's been known and used for 60 years, its importance in the manufacture of steel products is a comparatively-new development. Up till now, no comprehensive statement of the underlying principles was available. 268 pp., about $5.60, Hutchinson & Co. Ltd., 178-202 Great Portland St., London, W. I., England.

To avoid spray booth troubles

ask Oakite

OVER 50 YEARS CLEANING EXPERIENCE • OVER 250 SERVICE MEN • OVER 160 MATERIALS



Oakite curtain water treatment takes the "tack" out of overspray

Just a few inexpensive ounces of the right Oakite additive in the spray booth water curtain save hours of clean-up time. The reason: Oakite chemicals surround each droplet of paint with an "anti-stick" film that keeps spray from adhering to walls, pumps, lines and water nozzles. Paint that doesn't settle or float immediately will still wash through the system—but it won't stick, won't clog the sprays. The result: a water curtain without gaps, a smooth running system, *no* unplanned downtime.

There's a full line of Oakite water additives... one to match any of the countless paints, enamels and organic coatings. The *right* one will help paint sink to the sump... or float to the surface for skimming off... or overcome special hard water troubles... or combat foaming problems. What's *your* problem? Ask the Oakite man to make free tests in your paint spray booth. They won't interfere with production. They may save you hours of spray booth downtime. Bulletin F-9443 tells more. Write Oakite Products, Inc., 28A Rector St., New York 6, N. Y.

it PAYS to ask Oakite

OAKITE

SCIENCE

over 50 Est. 1909 years' leadership in industrial cleaning

NEW PATENTS

Steel Refining

Improvements in, or relating to, steel refining (assigned to Ruhrstahl A.G., Hattingen-Ruhr, Germany), June 7, 1961. In the refining of molten steel, a hot gas containing carbon dioxide, some or all of which is generated by burning carbon monoxide with oxygen, is blown through the melt directly. British 869,953.

Engine Alloy

Stainless steel, P. A. Jennings (assigned to Armco Steel Corp.), Aug. 8, 1961. A high-temperature stainless-steel alloy suitable for internal-combustion engine parts consists of: 0.55-0.8 pct C, 9-15 pct Mn, up to 0.45 pct Si, 21-27 pct Cr, 0.3-0.5 pct N with the sum of C and N being not less than 0.92 pct, up to 2 pct Mo, and the balance essentially all Fe. Canadian 625,141.

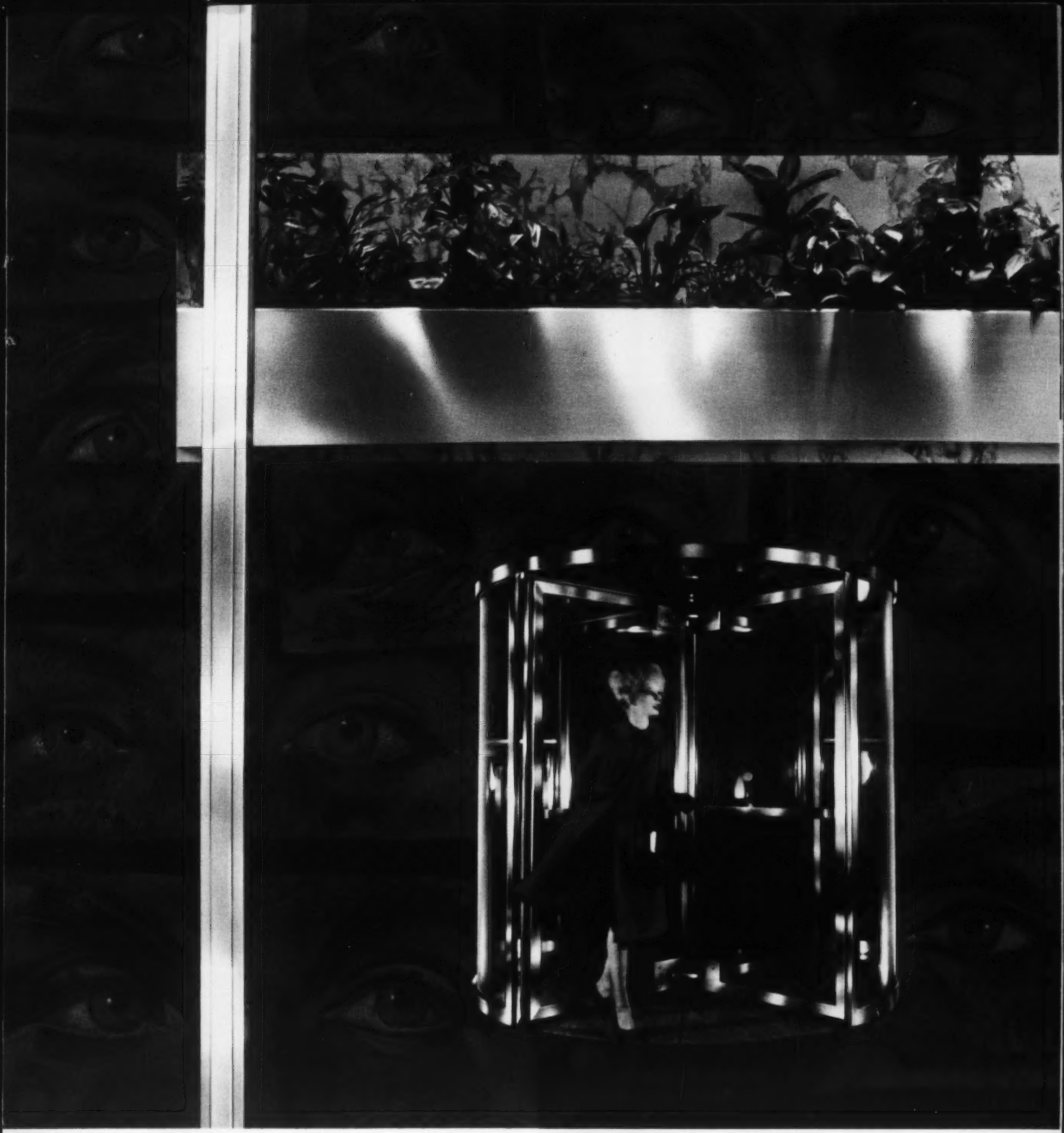
Iron Reduction

Iron-oxide reduction, A. M. Squires (assigned to Hydrocarbon Research, Inc.), Aug. 8, 1961. In the three-stage hydrogen reduction of magnetite or other iron-oxide ores, the oxide is partially reduced with hydrogen at 750-1000°F. It's then treated with carbon monoxide so as to coat the particles with carbon, and heated at 1300-1800°F to react the carbon with the residual iron oxide. Canadian 625,289.

Improves Deoxidation

Improvements in the deoxidation of iron and steel, H. M. Morgan (assigned to Foseco International Ltd., Birmingham, England), June 28, 1961. In the deoxidation of iron and steel, a tablet comprising about 76 pct swarf aluminum or aluminum alloy, 4 pct copper, and 20 pct cryolite is added to the melt. Addition of the copper improves efficiency. British 871,667.

Copies of U. S. Patents are available at 25c each from Commissioner of Patents, Washington 25, D. C.



Duration of a first impression

Stainless steel has its own beauty secret. What meets the eye today will be unchanged 20 or 30 years from now, the finish still flawless, unmarked by wear or corrosive air. Unlike some architectural metals with beauty that is only skin deep, stainless will last indefinitely—with little or no maintenance.

Time-tested, consistent product performance like this comes from consistent quality materials—and J&L leads the stainless steel industry in melt shop standards, the point where quality starts. That is why J & L stainless, in a variety of finishes, is widely used in all types of buildings, inside and outside, wherever a first impression—and a lasting impression—is important.

Your J & L distributor can provide the technical assistance and the consistent quality stainless steel you need, backed by the consulting services of J & L's architectural department.

Jones & Laughlin Steel Corporation

STAINLESS and STRIP DIVISION · BOX 4606 · DETROIT 34 · MICHIGAN

STAINLESS

SHEET · STRIP · BAR · WIRE

Rings from:
410 Stainless • A-286
Rene' 41 • Waspaloy
17-7 PH • Greek Ascoloy

Rings from:
Carbon Steel • U.S.S. T-1
Armco Iron
Chromoloy • 4140-4130

Rings from:
310 • 321 • 430 Stainless
Inconels
Hastelloys • 19-9DL

Rings from:
Titanium & Titanium Alloys
Aluminum Alloys

Also rings from: Bearing Bronze, Low Alloys, Magnesium, Zirconium and Copper Base Alloys

we make rings-you save money

Today Amweld is making flash butt-welded rings from nearly a hundred different metal alloys for over a hundred different applications. In each case the customer saves money over the cost of alternative ring making processes. He saves on metal, because Amweld forms rings from stock that is produced to or near finished dimensions. He saves on machining, because the metal is left out—not hogged out.

Amweld customers saved over one million dollars last year. By close cost evaluation of circular components and assemblies, flash welded rings were introduced enabling substantial savings. It doesn't cost you to think on paper with Amweld. Let us quote you for your cost comparison. Write today: The American Welding & Manufacturing Company, 702 Dietz Road, Warren, Ohio.

AMWELD®
INDUSTRIAL PRODUCTS

THE AMERICAN WELDING & MANUFACTURING CO., WARREN, OHIO

New Catalogues And Bulletins

Money-saving products and services are described in the literature briefed here. For your copy, just circle the number on the free postcard.

Wet-Blasting Units

A new, six-page, fully-illustrated brochure tells all about a line of wet-blast units. In addition to photographs and dimensioned drawings on each of eight units, the literature explains the difference between "High Velocity" and "Regular Velocity" wet-blasting processes. (Pressure Blast Mfg. Co., Inc.)

For free copy circle No. 1 on postcard

Milling Machines

Specifications and illustrations point up the advantages of Rangemaster milling machines in a new 20-page brochure. These sliding-head units are available as either plain- or universal-type machines. In the brochure, specs and illustrations cover construction, operations and optional equipment. (Browne & Sharpe Mfg. Co.)

For free copy circle No. 2 on postcard

Precision Gaging

A complete catalog features an entirely new line of transistorized, precision, low-cost gaging instruments. (Techni - Rite Electronics, Inc.)

For free copy circle No. 3 on postcard

Heat Treatment

Spin/Hard heat treatment of sprockets, gears, traction wheels and rollers that require hardened areas for high-wear resistance is the subject of a new four-page folder. This heat treatment produces a minimum hardness of 55 Rc, ⅜-½ in. deep, on iron and steel castings and fabricated components from 8-42 in. in diameter. (Link Belt Co.)

For free copy circle No. 4 on postcard

Steel Blanks

In four pages, a new catalog describes and illustrates a complete line of high - speed - steel reamer and drill blanks. Full specifications on individual blanks and blank sets are included — as well as facts about the company's special process for heat treating high-speed steel in continuous mill-length bars. (Ace Drill Corp.)

For free copy circle No. 5 on postcard

Points to Precision

A new 22-page booklet describes a full line of special components for use in government space and defense programs. An example of the work covered is a tapered spindle, accurate to 0.00005 in. (C. L. Berger & Sons, Inc.)

For free copy circle No. 6 on postcard

Conveying Elbows

New literature is available on a line of conveying elbows and tubing elbows, constructed of steel or aluminum. Standard bends are 45° and 90°, but the elbows can be furnished to any spec. The literature covers sizes and models as well as illustrative engineering drawings. (Systems Engineering & Mfg. Co.)

For free copy circle No. 7 on postcard

Tool Tidings

Some unusually-difficult and high-precision production problems appear in a four-page booklet. A brief description explains the operation of a mass-spectrometer leak detector which will discover a flaw so tiny it would take 63 years to pass 1 cc of helium through it. (Allen Tool Co.)

For free copy circle No. 8 on postcard

Shop Equipment

A new 52-page catalog lists a wide selection of new and used material-handling and storage equipment, plus a full line of steel office

---

Postcard valid 8 weeks only. After that use own letterhead fully describing item wanted. 10/12/61

Circle numbers for Free Technical Literature, Design Digest, or New Equipment:

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61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
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No postage necessary if mailed in the United States

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furniture and accessories. Also listed are fork lift trucks, pallet trucks, portable stackers, skid platforms, conveyors and lockers. (Industrial Handling Equipment Co.)
For free copy circle No. 9 on postcard

Handles Special Jobs

The current issue of "Mech-Spec News" outlines the company's capabilities in precision machining and tooling. It also covers its design know-how in the production of special-purpose machines and ground-support equipment. Featured is the temperature-control equipment for an entire jig-boring facility. (Mechanical Specialties Co.)
For free copy circle No. 10 on postcard

Removes Compounds

An emulsion cleaner, designed to remove hard-impacted buffing compounds from all types of base metal, is fully described in the four-page datasheet. The product may be used in concentrations as low as 5 pct for maximum economy. Of course, concentrations may be varied to suit conditions, with 5 pct giving a normal emulsion and above 20 pct an invert emulsion. (Macdermid, Inc.)
For free copy circle No. 11 on postcard

Conveyors

This four-page bulletin describes a line of customized steel conveyors. The prefabricated sections can be assembled to form any type of hinged steel conveyor. The units handle stampings, formed-metal parts, forgings, scrap, clips, etc. (May-Fran Mfg. Co.)
For free copy circle No. 12 on postcard

Machine-Tool Guide

To cover its wide range of literature on cutting tools, one company offers a four-page master guide. Some thirty brochures, booklets, catalog and article reprints are described in the folder. The object: To offer information that points the way to the right data to solve a specific problem. (Brown & Sharpe Mfg. Co.)
For free copy circle No. 13 on postcard

On Being a Buyer

"Purchasing As A Career," a 26-page booklet, concisely presents the basic facts dealing with career opportunities in the field of purchasing. The booklet is divided into seven chapters beginning with a description of the purchasing function. Quality, quantity, price, source of supply and value analysis are all explained. (National Assn. of Purchasing Agents)
For free copy circle No. 14 on postcard

Stainless Steel Products

The second edition of the Buyers Guide for Stainless Steel Consumer Products is now ready for distribution. This 106-page booklet is broken down into six categories: Automotive, hardware, home building and improvement, home furnishings, personal and recreation. (Union Carbide Metals Co.)
For free copy circle No. 15 on postcard

Light-Metals Data

Design data on the characteristics and properties of light metals, including magnesium, aluminum and titanium, are presented in a new brochure. It lists comparative values for various metals as an aid to the selection of materials. Information is presented in tabular and graphic form. (Brooks & Perkins, Inc.)
For free copy circle No. 16 on postcard

Casting-Bronze Alloys

A four-page color brochure describes a special Continucast process for producing bearing bronze parts. The brochure lists physical properties of SAE 660 and a wide range of other SAE bronze alloys. (Johnson Bronze Co.)
For free copy circle No. 17 on postcard

Protects Equipment

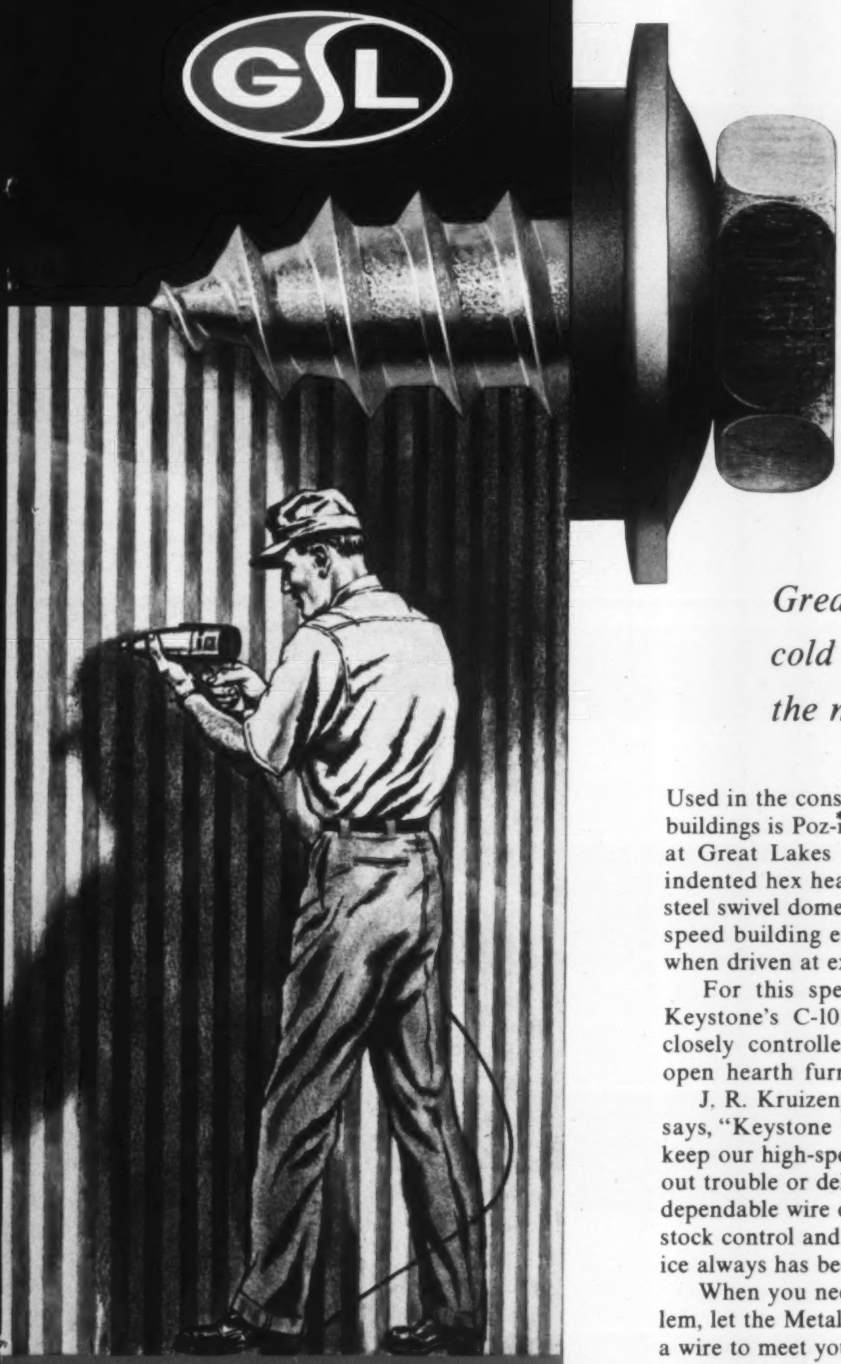
Damped laminates for control of structural resonant response is covered in a new eight-page bulletin. Its text explains basic considerations in design and selection of protection systems to combat structural fatigue, malfunctions and low reliability. (Lord Mfg. Co.)
For free copy circle No. 18 on postcard

Boiler Care

A new 24-page booklet entitled, "An Introduction to Boiler Feedwater Treatment" answers questions such as: How pure must the feed water be?; What is meant by external and internal feedwater treatment?, and many more. (Nalco Chemical Co.)
For free copy circle No. 19 on postcard

Slip-Resistant Floor

Three thicknesses of raised-lug pattern steel plate provide safety flooring for steps, ramps, column, covers, platforms, skywalks and truck fenders. All applications are illustrated and described in a new eight-page bulletin. Weights, sizes, and safe loads, along with installation instructions, are also included. (Joseph T. Ryerson & Son, Inc.)
For free copy circle No. 20 on postcard



KEYSTONE WIRE SPEEDS METAL BUILDING ERECTION

Great Lakes Screw Corp.
cold heads **Poz-*i-seal**®,
the moisture sealing fastener

Used in the construction of industrial fabricated metal buildings is Poz-*i-seal, a sheet metal fastener developed at Great Lakes Screw Corp., Chicago, Ill. It has an indented hex head with Type A point and a hardened steel swivel dome washer, plus rubber seal. Designed to speed building erection, it provides positive seal even when driven at extreme angles.

For this special fastener Great Lakes specifies Keystone's C-1018 Direct Drawn Wire made under closely controlled manufacturing procedures — from open hearth furnace to finished wire.

J. R. Kruizenga, Vice President in Charge of Sales, says, "Keystone Wire flowability and uniform quality keep our high-speed heading machines operating without trouble or delay. Keystone Steel & Wire Company dependable wire deliveries help us maintain an efficient stock control and continuous operation. Keystone service always has been excellent."

When you need a solution to a wire forming problem, let the Metallurgists at Keystone help you develop a wire to meet your most exacting specifications.

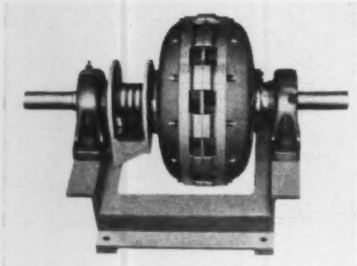
Keystone Steel & Wire Company, Peoria, Illinois

KEYSTONE DIRECT DRAWN WIRE STUDY

KEYSTONE

WIRE FOR INDUSTRY
MADE AT PEORIA, ILLINOIS, U.S.A.

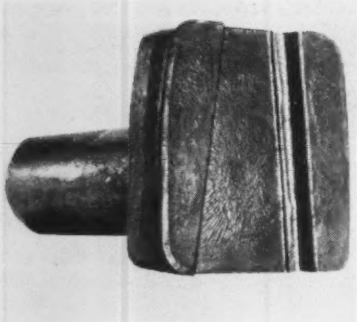
New Materials and Components



Clutch Maintains Torque While Blocking Overloads

Hysteresis clutches are available with 10-hp ratings at 1800 rpm. What's a hysteresis clutch? It's an electro-mechanical device that delivers controllable torque from zero to synchronous output speeds or a constant output speed for varying torque demands. Used with a servo amplifier, it provides overload protection in drive systems. The hysteresis clutch slips at a preset load while keeping the driven load at the desired torque. Torque settings are made by varying dc excitation. (Scanner Corp. of America)

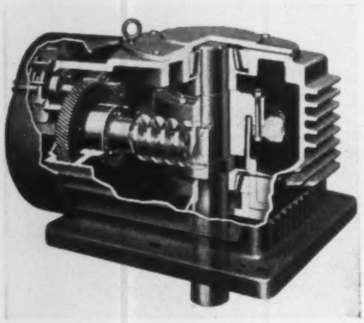
For more data circle No. 21 on postcard, p. 207



Upset-Forged Parts Boast High Strength Levels

Substantial cost reduction with upset-forged parts over conventional castings has been proven in the production of a steering-link pedestal. This part has a dovetail groove for fast front-end changeovers on all-purpose farm tractors. The link's groove and off-center shaft presented a very-tough upset-forging challenge. However, working on a precision six-inch upsetter, engineers found they could produce the unusual shape while holding close tolerances. As a result, the part is now turned out with a major savings in both machining time and metal. Weight of the forged part is 27 lb. (Commercial Shearing & Stamping Co.)

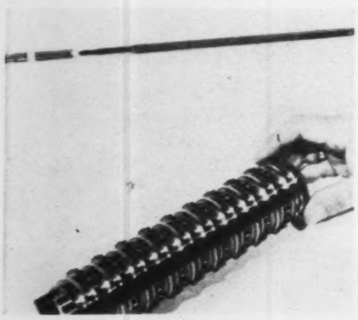
For more data circle No. 22 on postcard, p. 207



Reducer Ratios Range From 35:1 to 250:1

Use of a helical- and worm-gear double reduction combination hikes the efficiency of high-ratio worm-gear reducers. These units are available with output shafts that extend either upward or downward. The helical and the worm gearing run in a large-capacity common oil bath. Capable of withstanding overloads of 300 pct, the helical gears are hobbed, crown shaved and flame hardened. Aluminum or plastic cooling fans are mounted on each high-speed pinion. This insures adequate cooling of the heavily-finned cast iron housings. All shafts and bearings take overhung loads. (Cleveland Worm & Gear Div., Eaton Mfg. Co.)

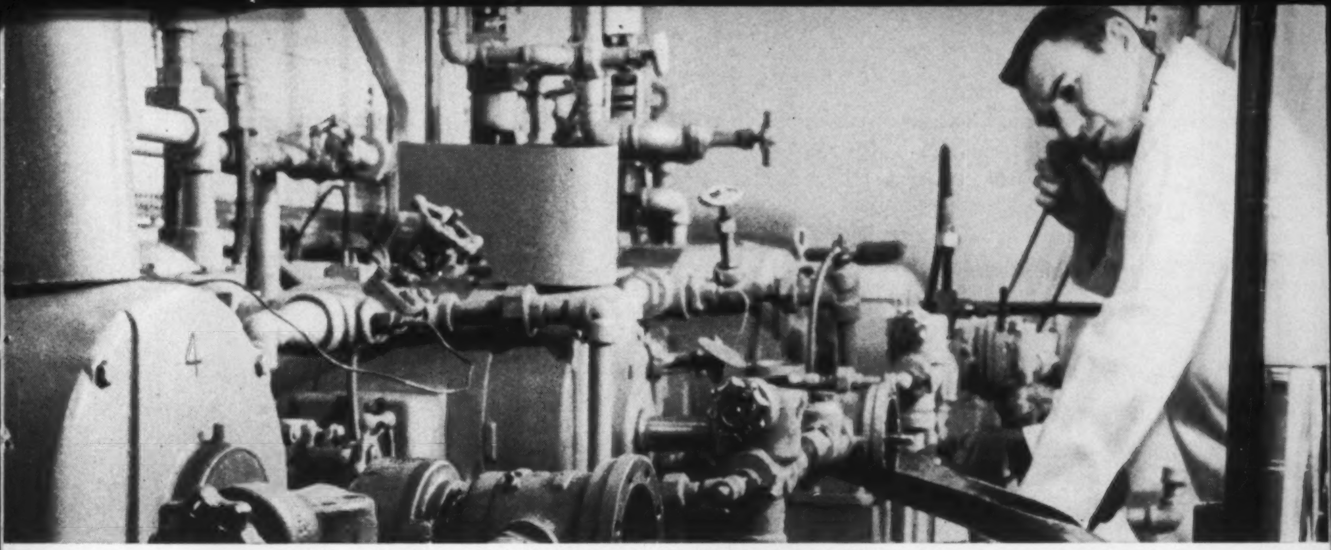
For more data circle No. 23 on postcard, p. 207



Tool Cuts Teeth and Broaches Cores at Same Time

A new broach-design concept insures precision concentricity relationships between the inside diameter and the pitch diameter of internal gears or splines. This special tool is made from a roughing broach with a removable finishing shell on the end of the broach. The shell has alternate round- and spline-finishing sections. Shell teeth are full involute in form. The round sections that finish the ID of the teeth are also full-circle and precision ground. Simultaneous cutting action is employed. The newcomer shaves every tooth profile to proper form and size while the part's ID is being broached to size. (National Broach & Machinery Co.)

For more data circle No. 24 on postcard, p. 207



Listening for pump chatter. Here—in Shell's Martinez, California, laboratory Shell Tellus hydraulic oils are subjected to the most demanding tests.

BULLETIN:

Shell presents a question-answer guide to help you select the hydraulic oils for top performance

Selecting the proper hydraulic fluid for your equipment can be one of your most important decisions. And it can pay off in many ways. Less down-time. Longer equipment life. Lower cost per unit.

Here are six bench marks to help you pick the best hydraulic oil for your plant requirements.

1. Does it have good oxidation stability? Oxidized hydraulic oil can form gums, lacquers and other deposits which may foul moving parts. Shell Tellus Oils are carefully refined to remove unstable, sludge-forming components—then fortified with a Shell-developed oxidation inhibitor.

2. Will it resist foaming and emulsification? Pump chatter and erratic operation are often the result of pump cavitation, brought on by oil foaming. Tellus® Oils contain additives to help prevent foaming.

3. Does it fight rust and corrosion? It is difficult to exclude all moisture from a hydraulic system. And moisture can form troublesome rust. Shell Tellus Oils have been carefully compounded to resist corrosion.

4. What are its lubrication qualities in continuous service? Shell Tellus Oils form a clinging, oily film on mating metal surfaces. This maintains a constant guard against wear.

5. How does it react to temperature changes? This is a key factor in the performance of hydraulic equipment. Careful selection of the proper viscosity grade of Tellus assures satisfactory operation of your system over its entire temperature range.

6. Is it available in several viscosity grades? Shell Tellus Oils are available in a broad range of viscosity grades. There's a special grade for virtually every hydraulic requirement.

Ask your Shell Industrial Products Representative for facts on Tellus Oils. Or write: Shell Oil Company, 50 West 50th St., New York 20, N. Y.

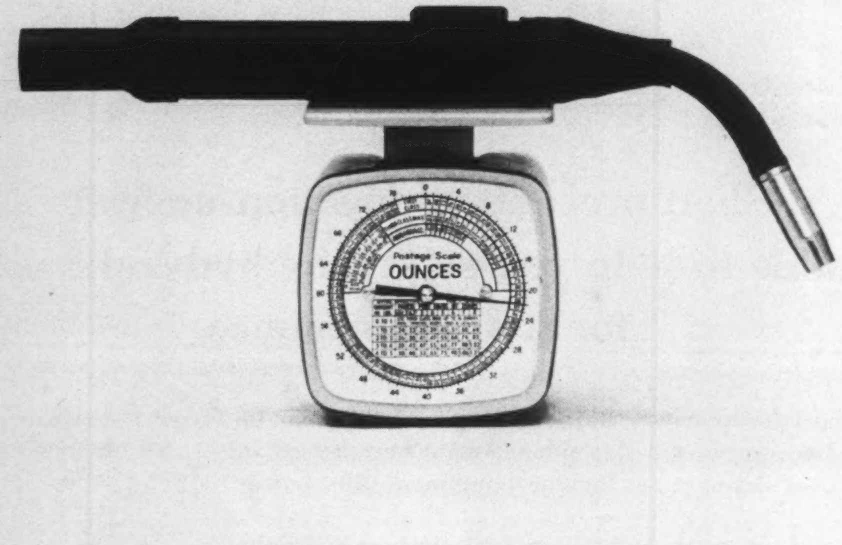
A message to manufacturers of hydraulic equipment

There is a Shell Tellus Oil suited for your equipment.

1. Your customers can get Tellus Oils at Shell depots everywhere. Readily available throughout the world.

2. Quality is consistently high. Tellus always delivers top performance.

A BULLETIN FROM SHELL
—where 1,997 scientists are working to provide better products for industry



22 oz. welding torch—business end of a new system that can clobber your welding costs

This new straight-through torch is the lightest, coolest and most maneuverable you can buy . . . yet it can handle wire at speeds up to 1170 ipm.

It's part of a new Westinghouse system for thin gauge welding that combines the speed and economy of semi-automatic welding with the maneuverability of stick welding.

To back up the torch there's a new wire drive system with a vernier adjustment that permits exact feed control heretofore impossible. The power source for the package is the proven Westing-Arc RCV silicon welder with built-in Dynamic Reactor.

For more information see the opposite page . . .

Westinghouse

New Westinghouse SA-200 Welding System

Here are some of the advantages of the new Westinghouse SA-200 system:

22 OZ. TORCH has an exclusive 360° rotating nozzle that permits the operator to keep the switch in the most comfortable position for any welding job. The torch is air cooled, has a 15-foot cable, handles both mild, stainless steel and aluminum wire. It can be used with CO_2, argon or argon gas mixtures.

PRECISE WIRE SPEED CONTROL obtained from a vernier type potentiometer gives you exact wire speed required—as high as 1170 ipm. Both drive rolls are powered to provide positive wire feed.

HIGH EFFICIENCY 200 AMP RCV WELDER provides lower power consumption than is possible with any comparable system. Controlled output characteristics of this welder, combined with precision wire speed control and a highly maneuverable torch, provides the ultimate in welding gauge size materials.

THE WESTINGHOUSE SA-200 SYSTEM will enable you to have *all* of the advantages of semi-automatic welding and yet retain the versatility of stick electrode welding. All this with as much a savings as 50% in your welding cost. Designed for production welding, there is a continuous feed from a 25 lb. spool of wire, no slag removal, no stub loss, and with the highest deposition efficiency.

READY TO ADVANCE? Call your Westinghouse distributor for a demonstration, or write Westinghouse Electric Corp., Westing-Arc Dept., P.O. Box 2025, Buffalo 5, New York.

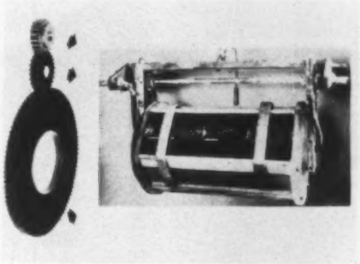
You can be sure . . . if it's Westinghouse.

J-10485

DESIGN DIGEST

Drives Plating Barrels

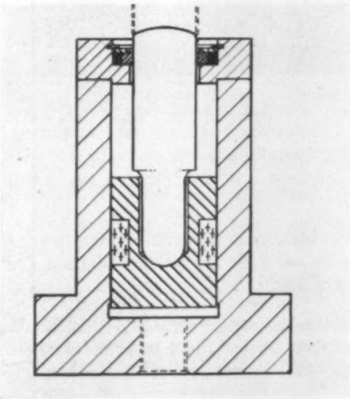
New gears are available in models to fit all barrel equipment—any make, type, size or age. These gears are inert to acid and alkali solutions at temperatures up to 220°F. In fact, they solve the costly problem of gear-drive incompatibility with solutions and processes. Key to the development is Seilon; the material from which the gears are made. Seilon's characteristics include impact and structural strength, resilience, and resistance to deterioration and contamination. (The Singleton Co.)



For more data circle No. 25 on postcard, p. 207

Hydraulic-Die Cylinders

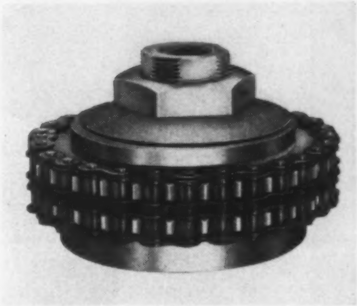
Here's a line of hydraulic die cylinders that the makers say will run 1 million cycles without maintenance. The new design is based on extensive tests which proved that even minute misalignment between the cylinder-bore axis and the line of die travel were the primary causes of die cylinder failure. The new approach is a self aligning series. A ball joint contact is used between the piston and the piston rod. Also, a floating guide ring serves to center the piston during installation. Once installed and in contact in the die, the floating guide ring acts as a wiper to prevent dirt from entering the cylinder. (Precision Products, Inc.)



For more data circle No. 26 on postcard, p. 207

Overload Switch

A new overload safety device provides overload protection through use of a basic OSD unit combined with a roller-chain coupling half counterbored to fit the unit's flange. Standard double-width roller chain is used to couple the basic unit and the coupling half. The overload safety devices are torque-limiting units that prevent costly breakdowns and excessive wear of equipment due to overloading. The devices automatically disengage when a set maximum load is reached, and are re-engaged automatically when the overload is eliminated. They are easily adjusted with a torque wrench to a specific maximum torque load. (Dalton Gear Co.)



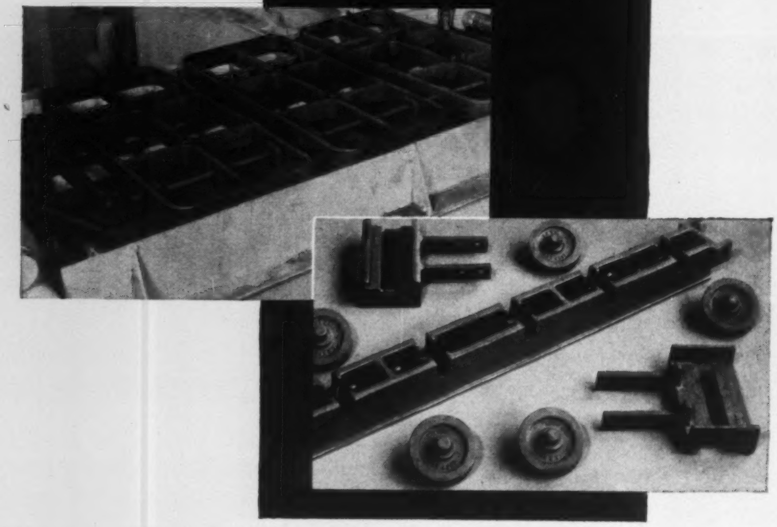
For more data circle No. 27 on postcard, p. 207

Drill-Bushing Tips

New drill bushing tips provide a fast, accurate method of portable or stationary mounting of drills and taps and other self contained machining units on a jig or fixture. The threaded end of the Taper-Loc bushing tip screws into the nose piece of the drilling unit. The unit's flanges fit under the shoulders of lockscrews or lockstrips on the jig, effectively holding the drilling unit in alignment and absorbing both

HOM CASTINGS

...to withstand temperatures in the 2100-2200°F range



The castings shown are for high temperature heat-treating furnaces. They are cast of a special HOM alloy, developed by Duraloy Metallurgists to meet the increasingly higher temperatures now confronting the metal working industries.

HOM is an alloy that retains considerable strength over a broad working area at 2200°F. It can be used for limited applications at 2300°F.

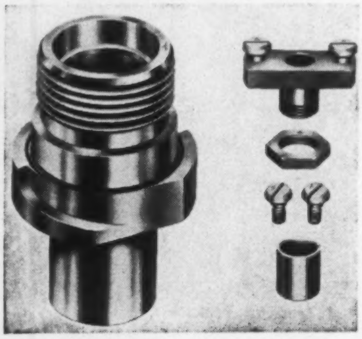
Duraloy Metallurgists—as exemplified by this HOM development—are always on the alert to broaden their service to industry. They have the knowledge, experience and equipment to make good high alloy castings for your requirements whether static, centrifugal or shell-molded. Bulletin G-261 gives full details.

DURALOY

ALLOY CASTING INSTITUTE ACI MEMBER

The DURALOY Company
OFFICE AND PLANT: Scottdale, Pa.
EASTERN OFFICE: 12 East 41st Street, New York 17, N. Y.
CHICAGO OFFICE: 332 South Michigan Ave., Chicago, Ill.
DETROIT OFFICE: 1025 Maple Road, Troy, Michigan
HOUSTON OFFICE: 4101 San Jacinto, Houston 4, Texas

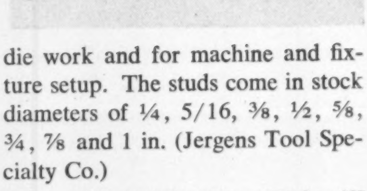
thrust and torque. A 30° turn locks or unlocks the unit. The tips are finished to ASA specs or can be manufactured to exact customer requirements. (American Drill Bushing Co.)



For more data circle No. 28 on postcard, p. 207

Heat-Treated Studs

Quarter-inch multiples of lengths up to 12 in. are available for new double draw and heat treated alloy steel studs. These newly developed studs, designed to prevent thread distortion and stud failure, are said to result in substantial savings in materials, man-hours and machine down time. With tensile strengths of more than 125,000 psi, these studs are used principally in tool and die work and for machine and fixture setup. The studs come in stock diameters of ¼, 5/16, ⅜, ½, ⅝, ¾, ⅞ and 1 in. (Jergens Tool Specialty Co.)



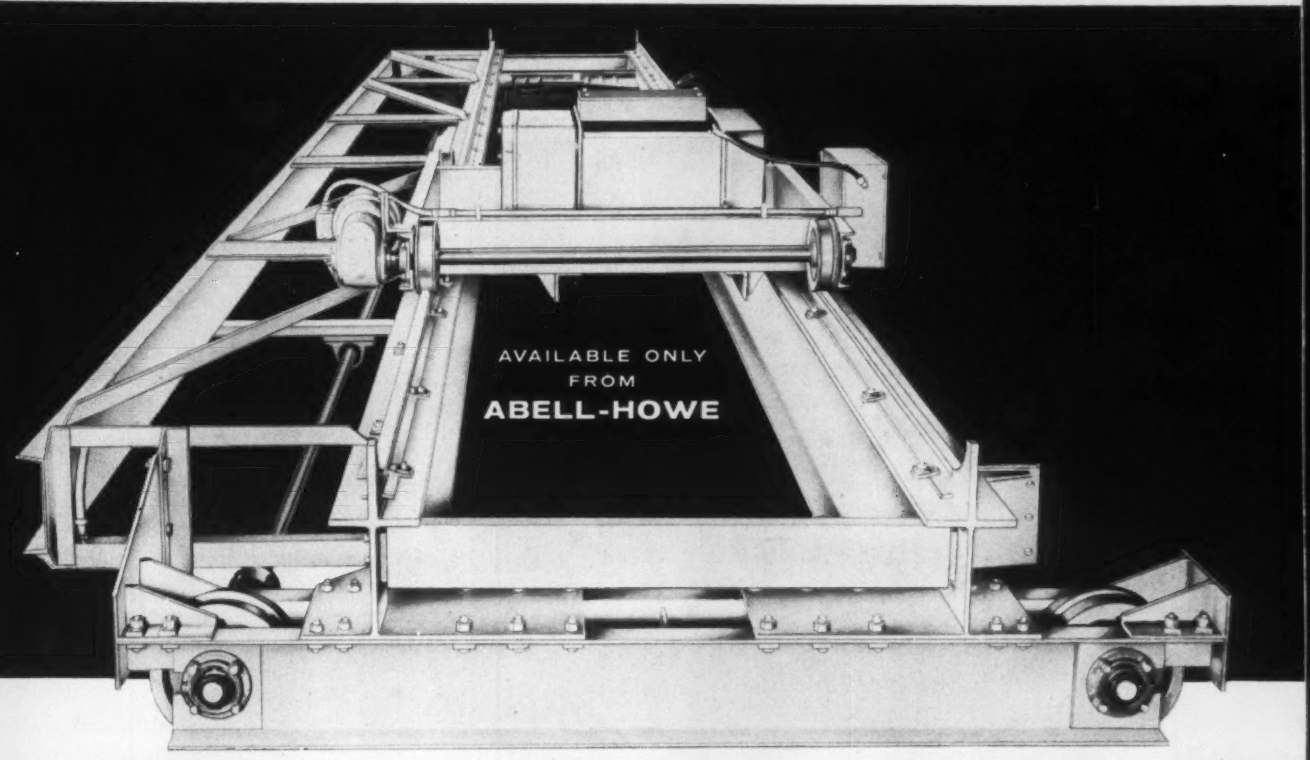
For more data circle No. 29 on postcard, p. 207

Power Converter

A new rotary actuator provides a simple but unique means of converting hydraulic power into uniform rotational motion. Among the applications for the new actuator,

A NEW EXPERIENCE

IN OVERHEAD HANDLING EASE AND ECONOMY



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Make no mistake—this is no ordinary, run-of-the-mill crane. Here is more crane quality—more modern design per dollar than you can get in any other crane built today. Direct drive, of course . . . die forged, machined alloy steel wheels with tapered tread . . . precision ball or roller bearings plus every other feature you want.

The result is the quietest, slickest, most maneuverable crane of them all. You can actually see, hear and feel the difference.

Those men who have already selected the all-new Cranemaster agree it's a honey—the best one yet. You can read all about this new experience in overhead handling ease and economy in a new 12 page Cranemaster bulletin, ready now. Or drop us a line and we'll come calling with some interesting facts and figures.

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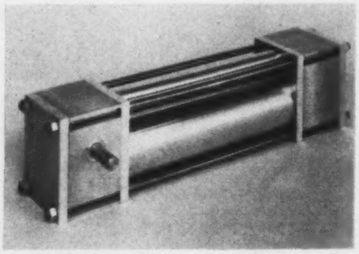
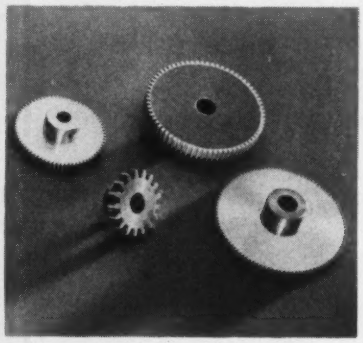
called the "Rota-Cyl," are the operation or actuation of fork lift trucks, drill presses, machine tools, valves, mixers, pressure regulators, torque amplifiers, conveyors, wiper motors, and precision torque wrenches. In these and similar applications, a Rota-Cyl actuator can perform the equivalent function in less than half the length required by a conventional cylinder-operated rack-and-pinion actuator. The saving in physical space is made possible because the unit performs a complete cycle within its own length, with no extending piston rods. Every unit is completely sealed, explosion-proof, and has no exterior moving parts other than the rotary power shaft. Operation is not limited to a single revolution, but can provide as many turns as desired, with constant torque throughout. (Graham Engineering Co.)



For more data circle No. 30 on postcard, p. 207

Precision Gears

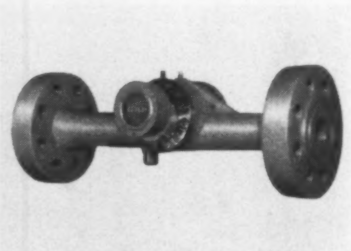
The accuracy required by some electronic units is attained only with the constant use of precision gears. Here's a full line of stock precision gears all of which are manufactured to stringent military requirements. These gears cover diametrical pitch ranges that include 24, 32, 48, 72, 80, 96, 120 and 200 that are available in stainless steel, aluminum, nylon, linen phenolic, in either split or clamp type tubs. Gears are to AGMA standards and are available to precision 1, 2, and 3 standards. Special precision gears are also made to NASA standards. (Tech-Ohm Electronics, Inc.)

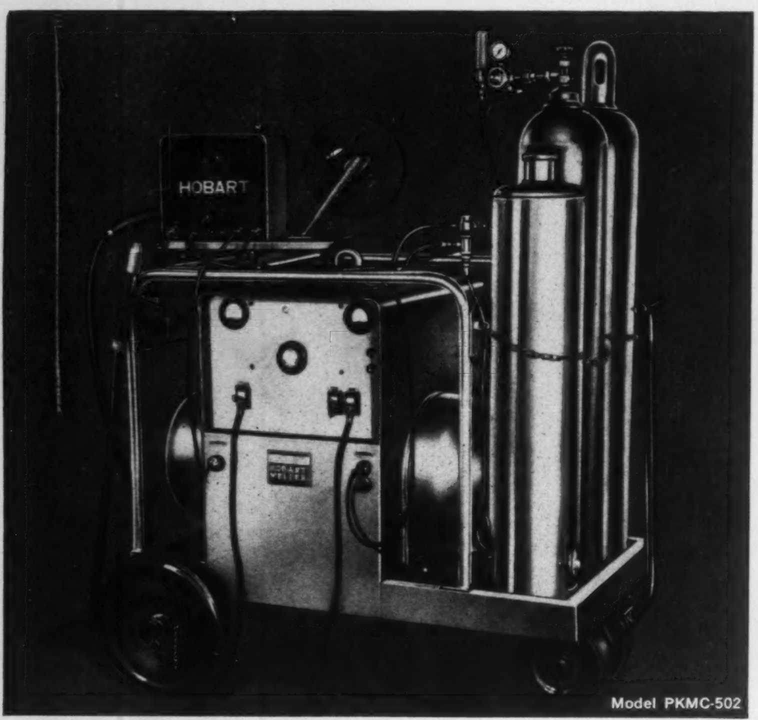


For more data circle No. 31 on postcard, p. 207

Pressure Flow Gage

A new 2-in. model flowmeter provides both an economical and accurate means of measuring gas or liquid flow. The rugged unit is con-





Multi-wire the new welder that handles all semi-automatic processes

Welds carbon steel, stainless, aluminum and many other non-ferrous alloys with the proper selection of easily interchangeable components.

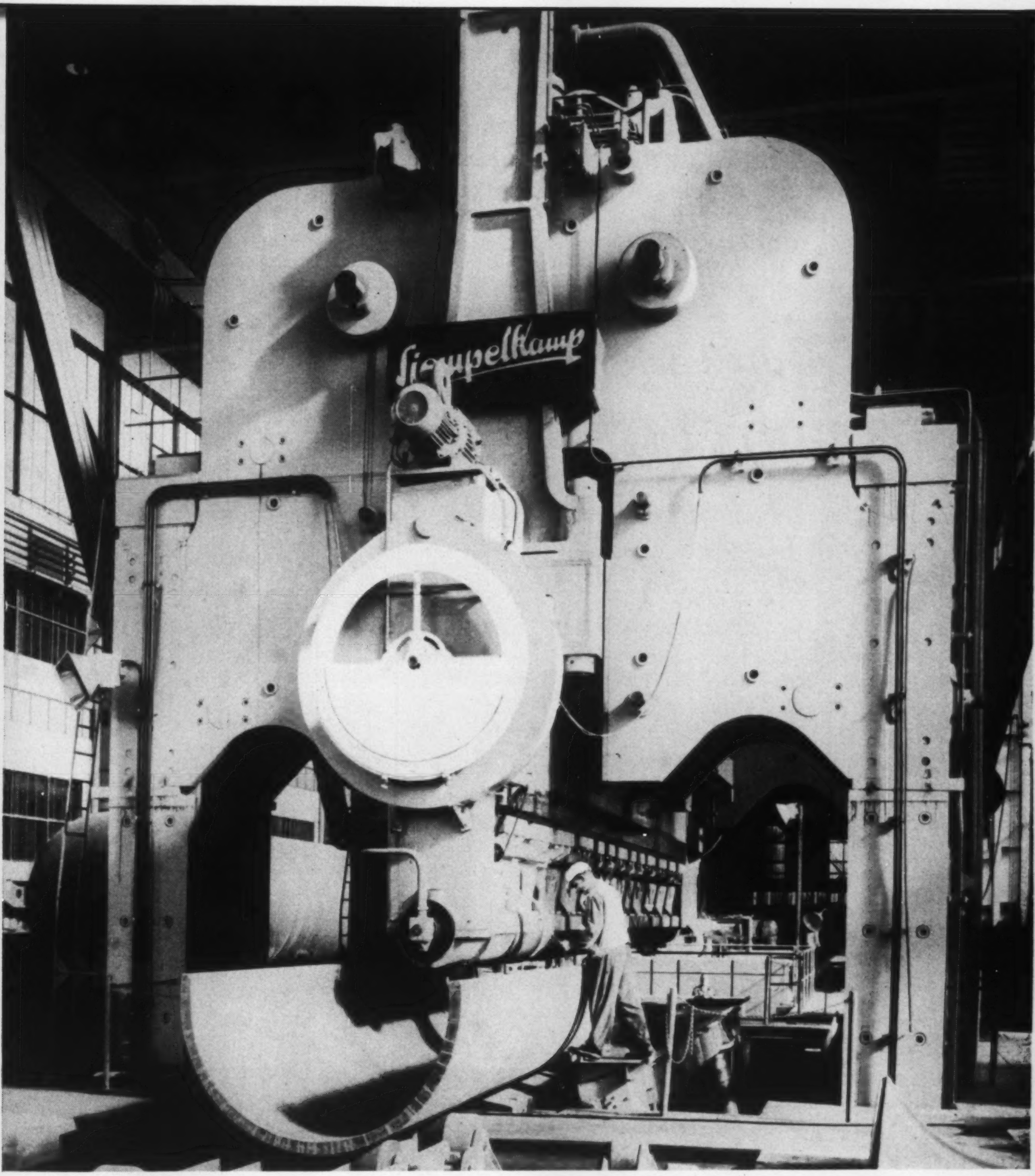
- MICRO-WIRE process for use with gas-shielded small diameter wire — all position.
- MIG-CO_2 for use with large diameter wire at high deposition rates, low cost CO_2 gas.
- FABCO process for high quality high deposition rates using low cost CO_2 gas and tubular wire.
- MIG-ARGON process (and other inert gases) for aluminum welding in all positions.
- SUBMERGED ARC for high deposition rates, high quality, on flat position work.
- OPEN ARC for hardsurfacing by using fabricated wire without shielding gases.

This welder is years ahead in concept and design and offers exceptional cost cutting advantages in **one complete package.** Write for details.

HOBART BROTHERS COMPANY, BOX IA-101, TROY, OHIO — Phone 513-332-1223

Manufacturers of the world's most complete line of arc welding equipment

International Sales, Hobart Brothers A.G., Box 5500, Nassau, Bahamas



Oilhydraulic Plate Bending Press for producing cylindrical and conical half-shells. max. plate length: 12 m max. plate thickness: 250 mm

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Who else wants to save $100,000 this year?

How the Revere Technical Advisory Service Showed a Metal User the Way to Profit-Protecting Economies — and can do the same for you!

A leading manufacturer—you'd recognize the name immediately—is a heavy user of copper and its alloys. It buys sheet, strip, tube, rod—by the hundreds of tons. Recently, this company invited the Revere Technical Advisory Service to inspect its operations, study its metals needs, analyze its buying practices and look into its specifications. The Revere people were actually treated as members of the crew at the company's plants; nothing pertinent was kept secret, no knowledge hidden.

The result? Recommendations all down the line on every phase of copper and copper alloy procurement and use—and production savings made possible in every area. The Revere Technical Advisor actually showed the way to an astonishing potential saving . . . well over $100,000 yearly!

Naturally, not every company can expect such huge savings. Too many variables enter in. But *if* detailed knowledge of metals, their manufacture and their uses can be applied to *your* product and *your* production, the Revere Technical Advisors are at your service. These are the men who know non-ferrous metals best—and many other metals equally well. They are ready to serve you—*now*.

You can reach the Revere Technical Advisory Service simply by calling or writing the Revere Office nearest you. If you are interested in a cooperative program of this kind and in discussing your metals procedures fully—in confidence—call Revere today. You will find that you have taken the first step toward profit-protecting economies. No obligation, of course.

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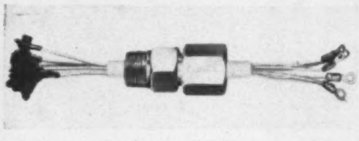
structed of an all-cast body. Pressure rating is 5000 psig; standard flowmeters are rated to 1500 psig. It is especially suited for such demanding applications as waterflooding operations in the oil industry, and for high pressure petrochemical processes. The meter is designed on the vortex-velocity principle of measurement. (Rotron Controls Corp.)

For more data circle No. 32 on postcard, p. 207

Lead-Sealing Devices

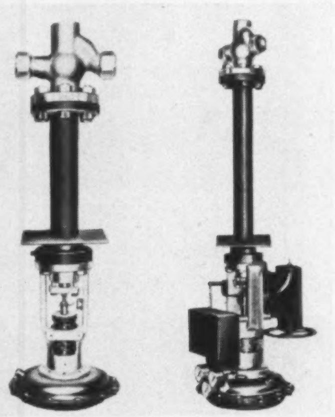
A new line of electrical lead sealing devices accepts two, four, six or eight wires. The unit incorporates a one-piece, single or multiple hole, ceramic insulator in which the protective covered wires fit. The insulator with the wires is contained in a stainless steel gland. By tightening the cap, the assembly is sealed for pressures of up to 5000 psi. The unit is available with a selection of soft sealants which increase the fatigue strength and vibration resistance by reducing stress concentration at the point of seal. Specifications include a temperature range of minus 40°F to plus 450°F. Sizes are 9/16 to 1½ in. hex. Mounting threads are ⅛ to ¾ in. IPS. (Conax Corp.)



For more data circle No. 33 on postcard, p. 207

Cryogenic Controls

A new design in cryogenic control valves handles a complete line of regulators and controllers. The throttling control valve is a globe type that eliminates the drawback of common split body types. The valves design eliminates seat ring threads and gasket crush as sources of leakage problems. Another special cryogenic feature permits complete disassembly of the valve from the top end. The valves are available in ½-4 in. bronze, aluminum or ½-2 in. stainless steel bodies with trim materials bonnet length actuator construction to suit most low temperature applications. (Leslie Co.)



For more data circle No. 34 on postcard, p. 207

Rosin-Core Solder

A special rosin-core solder provides up to 33⅓ pct greater flow to connections, increased wetting and insures greater reliability of solder, more joints per pound. Secret of this Alpha solder's unusual effectiveness

Dalmotor Div., Yuba Consolidated Industries . . . "used in model shop for turning, facing and boring all sorts of experimental parts."

Raytheon Manufacturing Co. . . . "used for turning, facing and boring operations on brass, aluminum and steel workpieces."

Over an extremely wide range of American industry . . . for tooling, production, maintenance and experimentation . . . the Lodge & Shipley 1307 HI-TURN (10") Lathe is making a record of true economy. With literally dozens of big lathe features, the HI-TURN is still priced substantially below many lathes having fewer features, less horsepower and lighter construction.

Turn your attention to HI-TURN. Find out why these and many other lathe users are ordering and reordering HI-TURN Production and Tracer Lathes to replace or supplement larger, far more costly lathes. For complete details, request Bulletin 331, The Lodge & Shipley Co., 3073 Colerain Ave., Cincinnati 25, Ohio.

THEY'RE ALL TURNING TO Hi·Turn

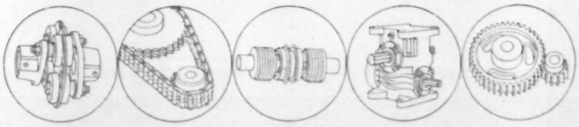
. . . your Lodge-ical choice

Lodge & Shipley

Rocketdyne Div., North American Aviation . . . "held OD turning to a tolerance of .0003""

Leading glass manufacturer . . . "unheard of economy, ease and speed of production" on machining and reworking glass bottle tooling.

Indiana Gear Works . . . has earned a reputation of "excellent for high production."



Morse has an answer to every industrial drive problem under the sun

From oil rigs, boats, and cars to missiles, mowers and machinery—look first to Morse for transmission of motion or power. You'll get impartial engineering help and immediate delivery on a complete range of products: Basic Drives, Speed Reducers, Couplings, and Clutches. Basic Drives alone include stock gears, roller chain, silent chain, "Timing"® Belt, and Hy-Vo® Drives. You'll find your Morse man in the Yellow Pages. Or write: Morse Chain Co., Dept. 33-101, Ithaca, N.Y. Export Sales: Borg-Warner International, Chicago 3, Ill. In Canada: Morse Chain of Canada, Ltd., Simcoe, Ont.

MORSE

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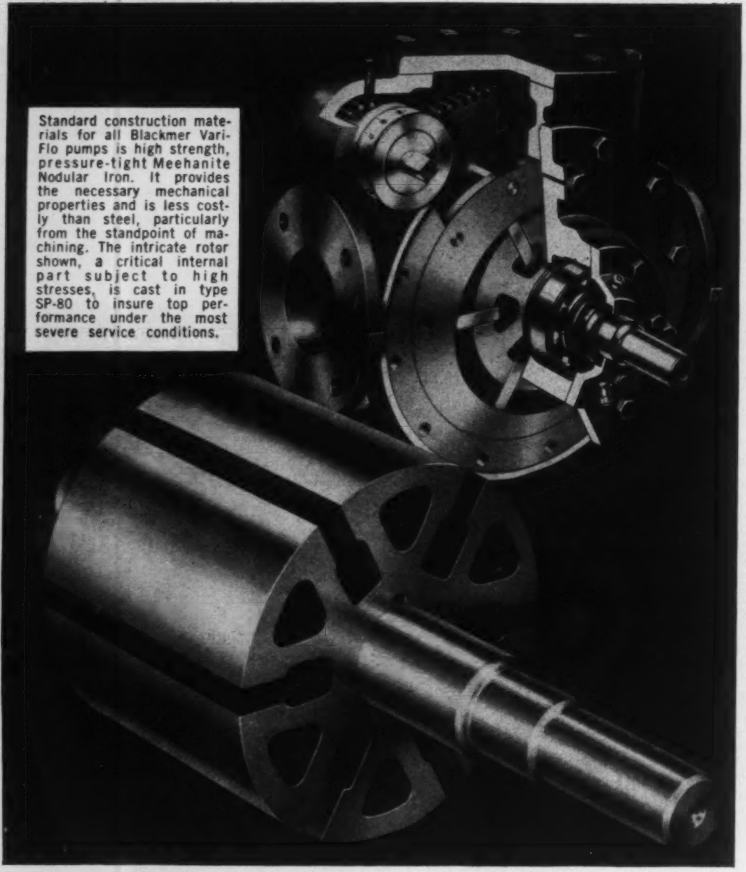
BW

MEEHANITE MEANS BETTER CASTINGS®



Standard construction materials for all Blackmer Vari-Flo pumps is high strength, pressure-tight Meehanite Nodular Iron. It provides the necessary mechanical properties and is less costly than steel, particularly from the standpoint of machining. The intricate rotor shown, a critical internal part subject to high stresses, is cast in type SP-80 to insure top performance under the most severe service conditions.

SOLVE YOUR TOUGH CASTING PROBLEMS WITH MEEHANITE NODULAR

The excellent castability of Meehanite Nodular in combination with exceptional strength, ductility and wear resistance has led to its wide acceptance for intricate pressure castings and many other components which must withstand severe service conditions. The broad range of its utility is further enhanced by inherent production advantages resulting in a reduction of manufacturing costs.

Meehanite Nodular is available in a broad range of properties embracing all current Nodular specifications and including some unique new wear and heat resisting types. When you specify one of the S types of Meehanite Nodular, you can be sure of obtaining castings that live up to specified claims. Meehanite foundries have more than a quarter of a century of experience in handling the essential materials used to convert the graphite in cast iron from the flake form to the nodular which gives this family of metals its unique engineering properties. Meehanite patented quality controls assure uniform dependability regardless of how small or how large the casting.

For complete information about Meehanite Nodular, send for a free single copy of our eight page brochure (B-47-A). Write: Meehanite Metal Corporation, 714 North Avenue, New Rochelle, New York.

MEEHANITE METAL

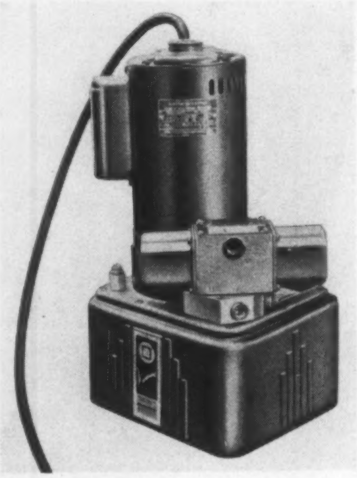
MEEHANITE CASTINGS ARE MADE ONLY BY MEEHANITE FOUNDRIES.

is the special way in which it's processed from virgin tin and lead. It is available in all alloys of tin-lead and may be had in tin-lead-silver for soldering silver-fired ceramic parts. It is supplied from 0.032 in. diam, and in varying flux percentages. (Alpha Metals, Inc.)

For more data circle No. 35 on postcard, p. 207

Hydraulic Pump

A new model Vanguard 2-stage hydraulic pumping unit, designed to increase the flow of oil during the high-pressure stage, operates at pressures up to 6000 psi. The pistons of the 5-cylinder axial piston pump, which operates during the high-pressure stage, have been enlarged to increase the pumping speed for high-pressure requirements. The low-pressure stage remain unchanged and consists of a high volume gear pump which quickly moves the hydraulic ram to and from the work. The new Vanguard VI, when equipped with a 3450

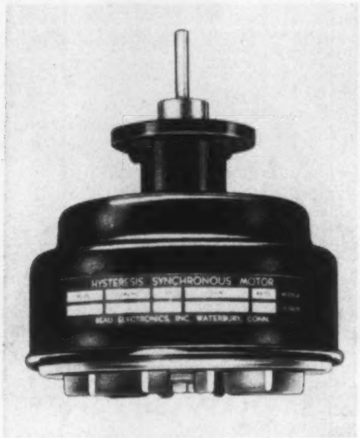


rpm jet pump type motor, delivers the following volume of oil at various pressures: 600 cu in./min at 100 psi; 400 cu in./min at 500 psi; 135 cu in./min at 1000 psi; 110 cu in./min at 6000 psi. A variety of motors, engines, valves, controls and accessories are available and can be easily mounted to meet various specific requirements. (Precision Hydraulics Div., Owatonna Tool Co.)

For more data circle No. 36 on postcard, p. 207

Dual-Speed Motor

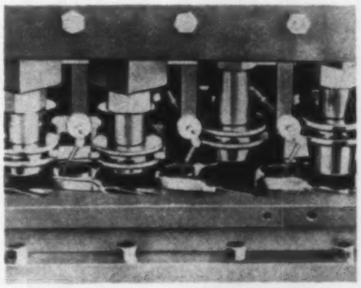
Offering stable outputs of 300 or 600 rpm, these new dual-speed synchronous motors boast inherent ruggedness which permits continuous running. They're designed to drive large inertial masses at a truly-constant rate of speed. The motor's integrated drive does away with the need for dual output shafts and dynamically-balanced flywheels, while maintaining close tolerances on the output shaft. One unusual feature is "inside-out" design. Under this concept, the rotor revolves around the outside of the stator. The motor ring acts as a permanent magnet and the poles shift as frequency varies. The result is an increased moment of inertia which has definite advantages in both torque and stability. (Beau Electronics, Inc.)


HYSTERESIS SYNCHRONOUS MOTOR
BEAU ELECTRONICS, INC. WATERBURY, CONN.

For more data circle No. 37 on postcard, p. 207

Pinpoints Malfunctions

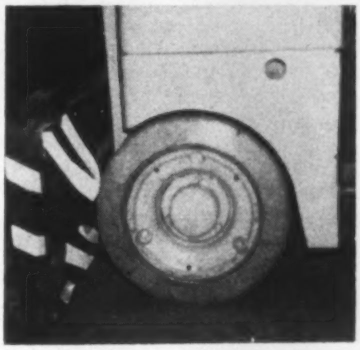
An improved electronic device signals the exact location of malfunctions in slide-transfer machines and shuts down the press automatically before damage can occur. Failure of die-blank work to transfer from one station to the next, for instance, will not only cause the unit to halt the press immediately, but the station where the potential problem lies is indicated to the operator by a signal light on the compact, easily-read control panel. These signal lights may be positioned on or off the press, or in a remote location. In addition to these visual signals, audible alarms are also available to indicate press shutdown. The device provides malfunction signals and complete protection for any number of stations. (Wintriss Controls, a division of Industronics Controls, Inc.)



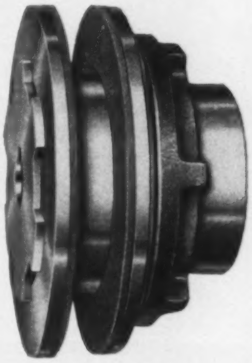
For more data circle No. 38 on postcard, p. 207

Press-On Tire

In the highly-competitive rubber industry, giant corporations tend to dominate new-product development. When a small company develops a new product, it causes more than a mild stir. And this would seem to be the case with a new press-on tire for lift trucks and materials-handling vehicles. They're made from a new polyurethane formulation that surpasses rubber in traction, cushioning and abrasion resistance. It's also non-marking on any floor surface. Water, oil, fatty acids, soap,



A Morse answer



Torque limiters

...when the problem involves automatic overload protection

Protect expensive equipment
Eliminate shear pins
Lessen costly downtime
Adaptable to any drive
Easily adjusted
Controlled torque setting
Capacities: 10 to 6300 ft.-lbs.
Clutch sizes: 3 to 20 inches
Distributor-stocked

Got a clutch problem? Call your Morse distributor. He's listed in the Yellow Pages.

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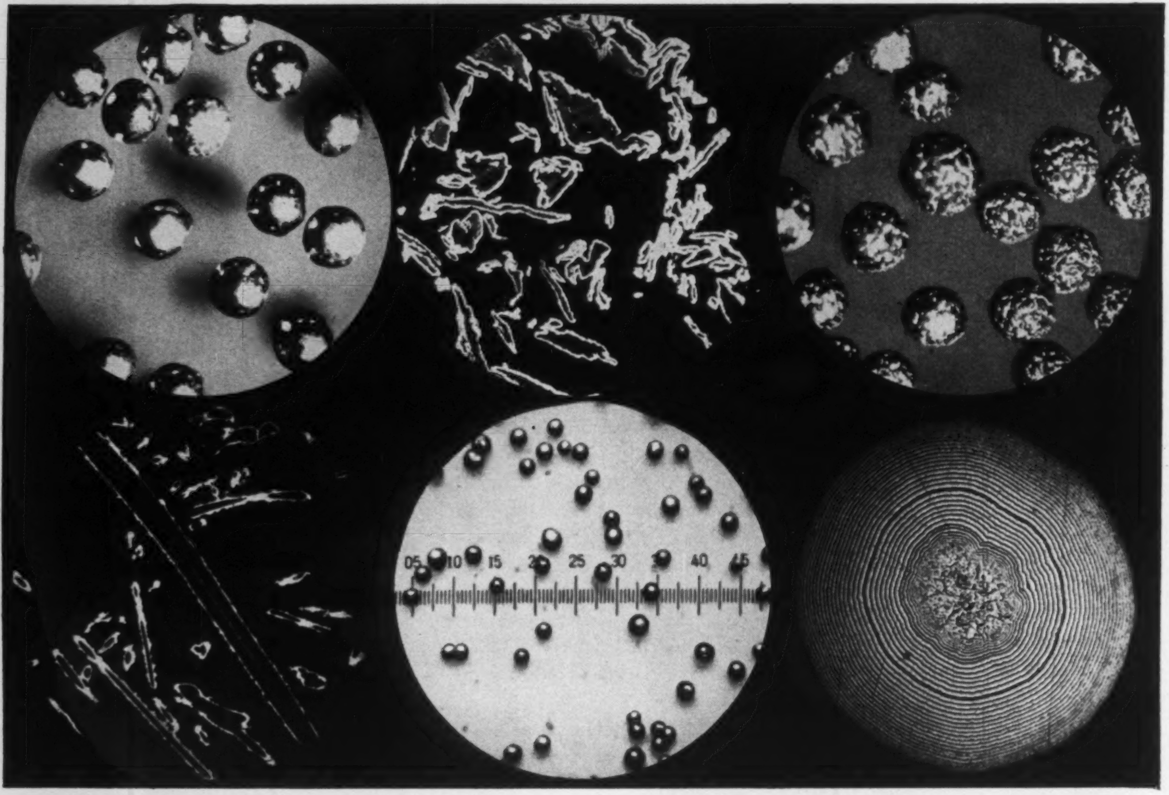
Morse Chain Co., Dept. 33-101, Ithaca, N.Y. Export Sales: Borg-Warner International, Chicago 3, Ill. In Canada: Morse Chain of Canada, Ltd., Simcoe, Ont.

For metallurgists with imagination . . .



An important advance in metal powders!

Clad powders with metal and non-metal cores open the way to new materials and technologies!

Out of the laboratory and into commercial use comes a concept that promises to advance metal powder technology.

Composite powders—made by Sherritt's patented process—consist of finely divided metal or non-metal particles coated with nickel or cobalt. The composition of these particles can be controlled to produce a wide range of materials with improved or unusual properties.

Composites with metallic cores include nickel-aluminum and nickel-tungsten. Various grades of graphite have been coated with nickel. High phosphorus alloys—not easily formed by conventional methods—are readily prepared with nickel or cobalt as the cladding. Carbides of tungsten, titanium, tantalum, chromium and silicon, and oxides such as alumina, silica, zirconia are used as core materials. Even ceramics and fibrous materials, such as asbestos and alumina-silica wool, have given good results. And, most recent of all, are coated-plastic powders, such as Teflon* coated with nickel.

Applications range from electrical resistance alloys, controlled expansion alloys and hard facing alloys to welding rods, permanent magnets, cemented carbides, bonded abrasive tools, and many others.

How will these metal-coated powders improve *your* processing or your products? What new uses will you make of them? If clad powders spark your imagination—or your curiosity—write our Technical Literature Department for free Booklet, "Metal and Composite Powders." Or, ask a Sherritt Contact Metallurgist to call. Address request to Marketing Division, Sherritt Gordon Mines Ltd., 25 King St. West, Toronto, Canada.

*Du Pont Trademark

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See another major Sherritt breakthrough . . .
a problem metal made ductile and workable!

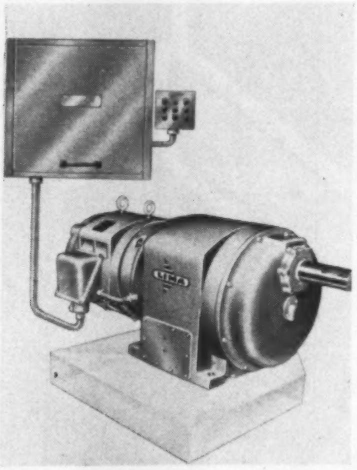
SHERRITT GORDON MINES LIMITED

detergents, de-greasing compounds or gasoline won't soften it. (Che-Mechanical Inc.)

For more data circle No. 39 on postcard, p. 207

Remote-Control Drive

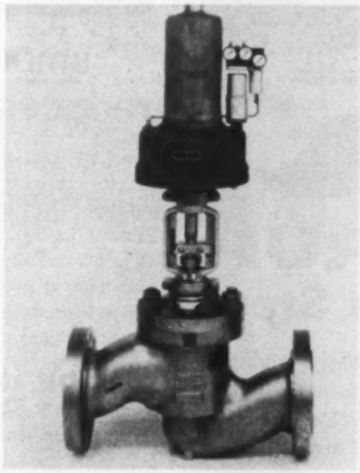
Hydraulic clutches, activated by electric solenoids, shift a new drive to any of six speeds while it's running under full load. This shifting is controlled by an electric pushbutton station which installs at any required distance from the drive. The units operate in reverse or forward position in all six speeds. These drives are engineered for use on equipment where lots of horsepower is necessary and multiple speeds are a must. They deliver full-rated horsepower at the output shaft in every speed. A unit-cast, semi-steel gear box assures permanent alignment of all working parts. (The Lima Electric Motor Co., Inc., a subsidiary of Consolidated Diesel Electric Corp.)



For more data circle No. 40 on postcard, p. 207

Valve Systems

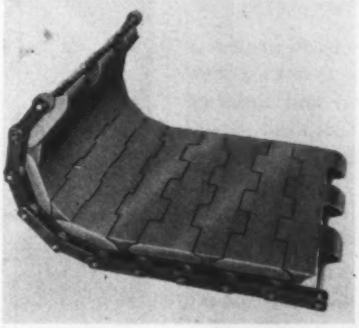
New valve systems include the valve, available in all ASA sizes and ratings, electro-hydraulic actuator, an electronic controller and associated transducers. The controller provides the signals that actuate the valve as well as the necessary systems equalization. With response capabilities to 100 cycles per second, many control applications formerly impossible, can readily be solved with this equipment. The new systems should be of particular interest to the process control industries. (Security Valve Co.)



For more data circle No. 41 on postcard, p. 207

Floor-Type Conveyor

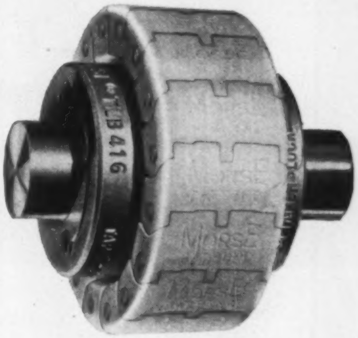
Flat-top, hinged steels conveyor belting can be installed above, or flush with the shop floor. The conveyor handles balky, hot or heavy materials and assemblies. The design forms a moving sidewalk. Even while in motion the flat-top conveyor permits a cross flow of foot or vehicle traffic without interrupting normal plant traffic. The conveyors can be designed and supplied to virtually any practical width from 12-60 in. Belts are made in 6 in. or 9 in. lengths. (May-Fran Mfg. Co.)



For more data circle No. 42 on postcard, p. 207

Self-Centering Rolls

Capable of positive centering and tracking of strip-like materials under all operating conditions, rubber-covered rolls offer multiple benefits



A Morse answer

Nylon couplings

...when the problem involves corrosion, cost, lubrication

Corrosion-resistant

Cost 20% less

Lubrication-free

Safety first

Easy disassembly

Standard stock sprockets

Fractional to 40-hp. loads

Speeds up to 5,000 rpm.

Distributor-stocked

Got a coupling problem? Call your Morse distributor. He's listed in the Yellow Pages.

MORSE

A BORG-WARNER INDUSTRY

BW

Morse Chain Co., Dept. 33-101, Ithaca, N.Y. Export Sales: Borg-Warner International, Chicago 3, Ill. In Canada: Morse Chain of Canada, Ltd., Simcoe, Ont.

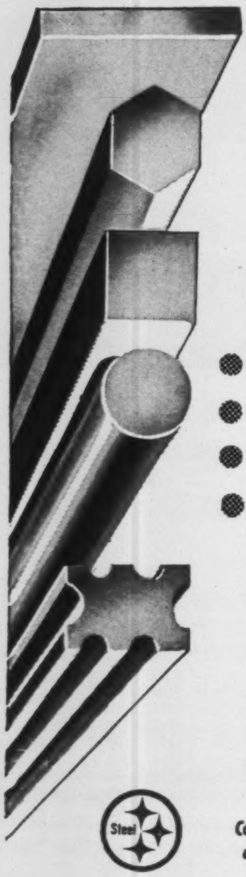
QUALITY

in *Your* product begins assuredly with

MOLTRUP

Cold Drawn Steel

Give your products the basic quality of Moltrup Carbon, Alloy, or Leaded Steel—cold drawn to *close tolerances* that aid and simplify your operation. Save time and cut costs by ordering the exact shapes needed—Flats, Rounds, Squares, Hexagons, or Special Shapes to your specifications.



These Advantages Win Customer Satisfaction

- metallurgical quality control
- close-limit precision-production
- fast shipments direct from plant
- district warehouse distributors

Moltrup precision products include Key Stock, Screw Stock, Turned and Polished Shafting, Polished Steel Plates, Foundry Pattern, Core and Bottom Plates. Your order or inquiry will receive immediate attention.

Steel

Consult telephone directory, in cities listed, or ask us for name of distributor nearest you.

Phone: TIlden 6-3100

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Cleveland, O. Los Angeles, Calif.

S4

RITCO FORGED

smooth "bright finish" reduces your product costs

The flaw-free, accurate surfaces of Ritco "Bright Finish" Forgings save costly finishing . . . also greatly reduce machining time. The further advantage of tremendous toughness in Ritco Forgings, due to controlled grain flow, assures the highest ratio of strength to weight and dependable impact resistance at points of greatest shock and stress. It will pay you to learn more about Ritco "Bright Finish" Forgings. Send us your blueprints for estimates.

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Member Drop Forging Association
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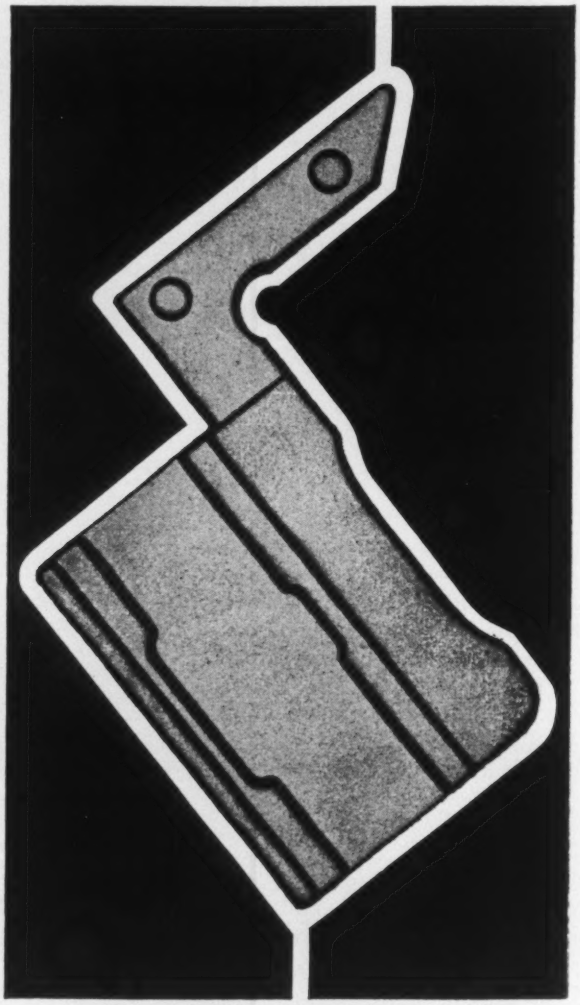
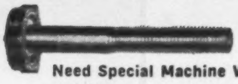
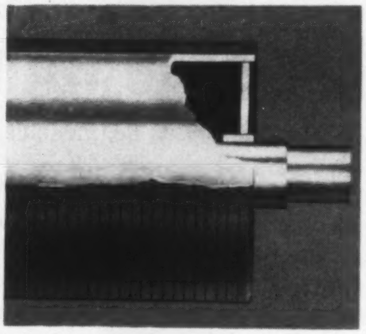




Need Special Machine Work—or Special Fasteners and Upsets? Our machining facilities are at your service. Let us know your requirements!

for many industries and processes. They're particularly beneficial when applied to tension bridles. The rubber covering also makes them quite useful in the handling of delicate strip. (U. S. Steel Corp.)

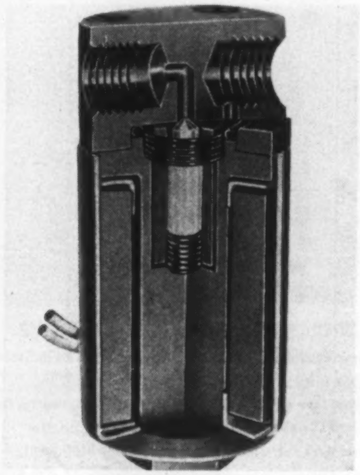
For more data circle No. 43 on postcard, p. 207



Tiny Solenoid Valves

These miniaturized, two-way, normally-closed solenoid shutoff valves operate at pressures up to 3000 psi. They're ideal for pilot plants, test systems, control circuits, etc. Each valve is available with either nylon or Kel-F poppets that insure bubble-tight sealing—even with corrosive fluids. The 1/16-in. orifice permits high-flow rates for such a tiny valve. (Circle Seal Products Co., Inc.)

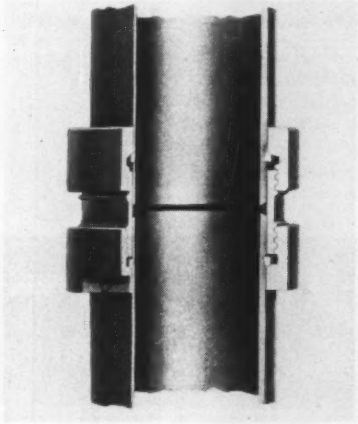
For more data circle No. 44 on postcard, p. 207



Tubing Couplings

A new coupling for metal and plastic pipe and tubing was designed especially to minimize cost of systems requiring frequent disconnections and reassembly. The new Quikupl coupling is low in first cost, is quickly and economically installed, and permits make and break of connections with a minimum of time and effort. The coupling has CIP approval. Simple and easy to install, the new coupling has three basic features: It provides straight-through, unrestricted flow; it is a union in itself; and installation requires only one low-cost tool. The coupling consists of a cylindrical connector piece into which pipe, tube, or fitting ends fit, which acts as a bearing surface and assures proper alignment. (Valve & Fitting Div., Cooper Alloy Corp.)

For more data circle No. 45 on postcard, p. 207



Threaded Inserts

A new series of self-anchoring threaded inserts, for sheet metal installations, employ a unique angular knurl which prevents loosening, once the insert is in place. Screw tension applied to the thread serves to pull the angular knurl more firmly against the gripping surface of the hole. Thus the higher the torque applied by the screwdriver, the tighter the grip of the insert. Threads are installed by pressing into a single hole in sheet metal as thin as 20 gage. Made of case hardened steel, the inserts are cadmium plated. The inserts are available in eight thread sizes from 4-40 to ¼-28. They are quickly installed with standard shop tools. (Southco Division, South Chester Corp.)

For more data circle No. 46 on postcard, p. 207

A Morse answer

roller chain

sprockets

...when the problem involves quality, cost and performance

Made to A.S.A. standards

Chain-maker quality

Precision pitch control

Controlled concentricity of bore, hub, and teeth

Advanced heat-treating processes

Face runout minimized by exclusive flattening process

Distributor-stocked

Got a sprocket problem? Call your Morse distributor. He's listed in the Yellow Pages.

MORSE

A BORG-WARNER INDUSTRY

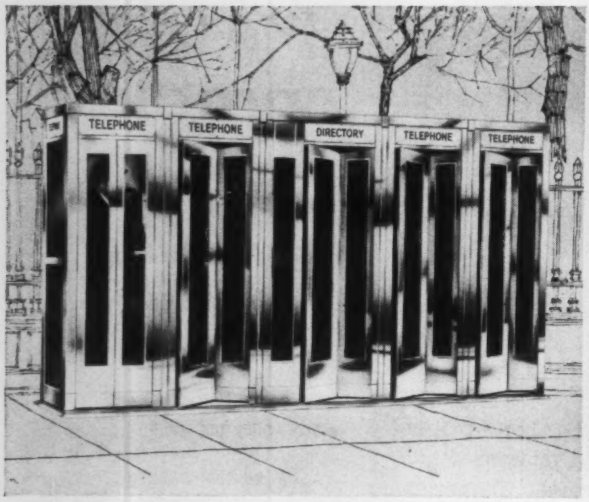
BW

Morse Chain Co., Dept. 33-101, Ithaca, N.Y. Export Sales: Borg-Warner International, Chicago 3, Ill. In Canada: Morse Chain of Canada, Ltd., Simcoe, Ont.

Give your products a competitive edge with

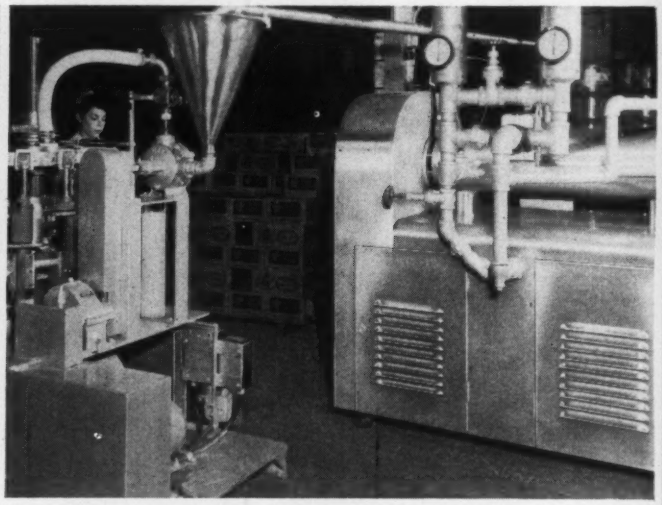
A new door sill will last a lifetime because it is Stainless Steel protected. A tank car is light, strong, easy to clean because it is Stainless. A storage vessel can keep liquid gases for long times without leaking or without contamination because it is made of Stainless Steel. Every day, Stainless is specified for demanding applications like these, because designers, manufacturers and their customers *know* that they can count on Stainless Steel's dependability every time.

Anyone who uses Stainless Steel gives his product added value. It has superior corrosion resistance to harsh reagents. Stainless Steel has great strength, so products can be made lighter in weight; there's no need to "over-design." It is attractive. Stainless Steel keeps its gleam. It doesn't fade or pit or take



Weather won't dull these Stainless Steel telephone booths

When you consider the abuse a phone booth has to take—rain, hot sun, corrosive atmospheres, vandalism and heavy traffic—it's easy to see why booths should be made of Stainless Steel. A Stainless Steel booth can stand up to all this punishment and still stay bright and new-looking for years. That's because Stainless Steel resists corrosion so well, is so strong, and can be *welded* into a tight, solid unit. These booths were manufactured by the Sherron Metallic Corporation, Brooklyn, New York.



Stainless Steel equipment makes peanut butter creamier

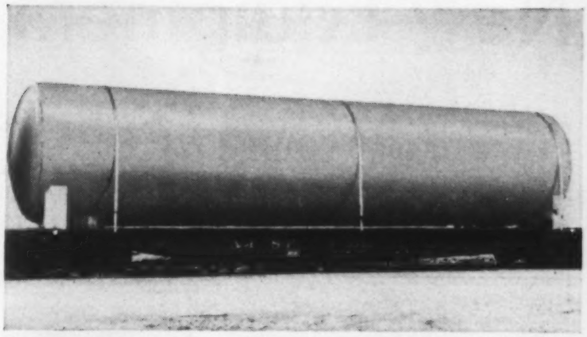
If creamy peanut butter is your dish, chances are it was processed in Stainless Steel equipment. This system takes whole roasted peanut meats in one end, grinds them, then the Votator equipment, manufactured by the Girdler Process Equipment Division, Chemetron Corporation, Louisville, Kentucky, cools the butter and turns out the finished product, ready for sandwich or cracker. Stainless Steel is used here in the heads and shaft of the heat transfer area to assure maximum cleanliness. The unit is sealed, so Stainless Steel's inherent corrosion resistance is insurance against expensive breakdowns.

Stainless Steel

For Stainless Steel, call your nearest Steel Service Center.

USS Stainless Steel

on a dulling film. And it is in the market that Stainless Steel shows its competitive edge of quality against most other materials. Go first class; specify Stainless Steel. You should consider Stainless Steel on the basis of quality and performance. We welcome the opportunity to work with you in finding new markets and new uses for Stainless Steel. Write U.S. Steel, 525 William Penn Place, Pittsburgh 30, Pa.

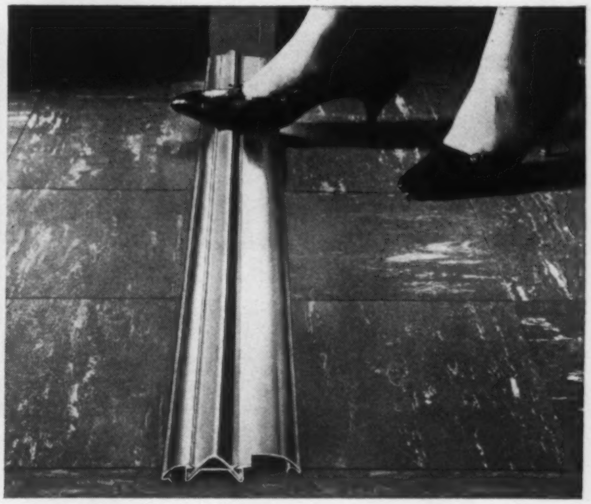


This is a Stainless Steel Lox box

The Lox Equipment Company, Livermore, California, specializes in building vessels that store and carry liquid oxygen. They use Type 304 Stainless because they know they can depend on Stainless to keep its toughness even at very low temperatures. Stainless stays clean, too—vitally important in applications like this. Lox also builds cryogenic vessels for the Air Force's Titan missile program—with Stainless Steel of course.

Stainless Steel keeps a kitchen good-cooking

Inspect the kitchen of any really fine restaurant and it's a good bet it will be Stainless Steel. Stainless Steel is invaluable anywhere food is prepared because it is easy to keep clean. It doesn't harbor odors or tastes, it resists corrosion, and it is so strong and long-lasting that replacement costs are insignificant. The finest home kitchens use lots of Stainless Steel for the same reasons, plus the fact that its gleaming appearance makes any kitchen a pleasant place to work. This Stainless Steel cooking equipment is by Vulcan-Hart Corporation, Louisville, Kentucky.



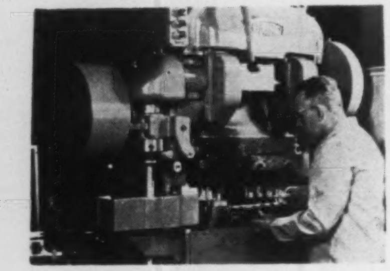
Stainless protected threshold costs no more

This new threshold by United Industries, Inc., Chicago, Illinois, will take the toughest kind of punishment and still keep a just-new appearance because it is Stainless Steel protected. There are no cracks or joints to catch dirt and it is 100% self-sealing to keep out drafts, heat, rain, snow and insects. It is quickly and easily installed and sells at no extra cost—another example of the added value Stainless Steel gives to a product.

USS United States Steel

TRADEMARK

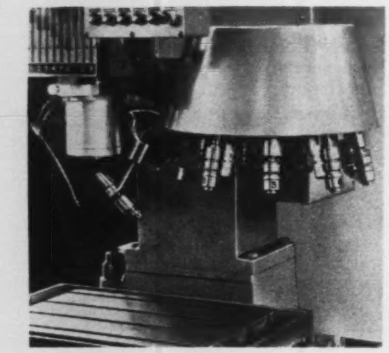
New Equipment and Machinery



Progressive Dies Feed Nine-Station Press Setup

Progressive die tooling is being used to make film-spool end caps. Ansco's R. G. Carr, production supervisor, reports: "This transfer press has increased production 36 pct with a corresponding decrease in labor costs." In operation, coiled stock is automatically fed into the transfer press in predetermined feed lengths. A nine-station die performs the following operations: Blank, first form, score, trim, draw, pierce, extrude, crimp, eject. Rated capacity is 15 tons. Stroke is 1¾ in. (The Baird Machine Co.)

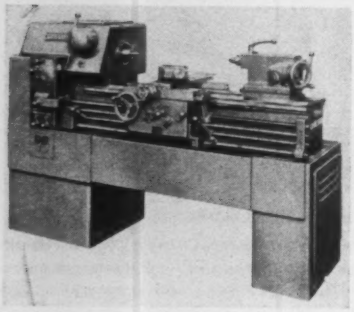
For more data circle No. 47 on postcard, p. 207



Automatic Device Changes Tools in 5 Seconds

According to the manufacturer, this tape-controlled tool changer will speed-up all drilling and tapping jobs by making very-fast tool changes automatically. This frees the drilling-machine operator for other pressing work. Now, tool changes can be made in 5 seconds. In addition to very-rapid operation, the unit features a high degree of versatility. It carries up to nine-different cutting tools which can be manually selected during setup. Once tools are selected, they're fitted with adapters and seated in individual storage positions in the rotating matrix. From that point on the tape control takes over, making tool changes and directing the complete drilling operation. (Edlund Machinery Co.)

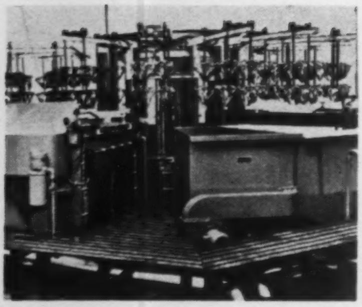
For more data circle No. 48 on postcard, p. 207



Dual Drive Lathe Holds Toolroom Tolerances

This 5-hp lathe is not only built to strict toolroom tolerances, it's built sturdily enough to hold them. Among its wanted, toolroom features are apron reverse to the leadscrew, single-lever selection of 16 speeds from 31-2400 rpm, and a built-in horsepower meter. Its proved-in-service, dual-drive headstock provides 12 gear-driven spindle speeds for positive power in the lower ranges. Four belt-driven speeds promote smooth power in the high range. The three-bearing spindle uses precision bearings. Lubrication is automatic forced feed. A new electric clutch provides smooth and positive stops and starts. (LeBlond Machine Tool Co.)

For more data circle No. 49 on postcard, p. 207



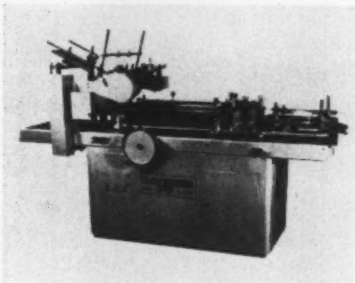
Automatic Plating Machine Uses Central Turntable

Made by Metallic Industry N.V., Loosdrecht, The Netherlands, a fully-automatic machine handles galvanizing and other surface treatments of metals. It performs the following sequence of operations: Suspension and removal; electrolytic degreasing; cold rinsing; acid bath; cold rinsing; zinc, cadmium or nickel plating; cold rinsing; passivating or acid bath; cold rinsing; decolorizing, chromium or brass plating; cold rinsing; and finally hot rinsing. Circular in shape, the machine is available in several models from 13-19½ ft in diameter. (The Netherlands Trade Commission)

For more data circle No. 50 on postcard, p. 207

Forms Packing Cartons

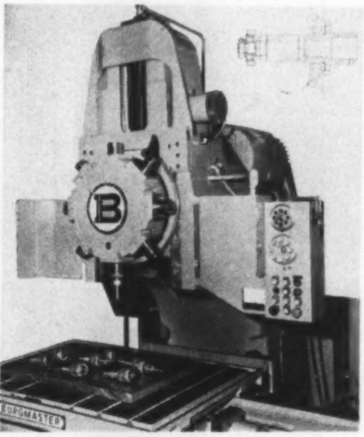
This high-speed, carton-forming machine features a patented setup method which yields production of up to 150 cartons per minute. Also, an ingenious heating technique substantially reduces dwell time for proper heat sealing. Heat-seal cartons, such as poly-coated, spot coated and vinyl coated containers, are moisture-proof, tasteless and odorless. At the same time, they're strong and inexpensive. In some cases, an increase in carton strength allows a direct reduction in cartonboard thickness. Of course, this further decreases material costs. (Hayssen Mfg. Co.)



For more data circle No. 51 on postcard, p. 207

Turret Drills

Turret drilling, tapping, boring and milling machines are now available with hollow spindles for use with adjustable, preset tool holders and tools. The hollow spindle makes production setup a quick chore. All tools used in the run can be preset to length on the bench while the machine is operating. The hollow spindles also reduce the amount of



Kidde
REMOVE HORN PULL TRIGGER
Kidde
REMOVE HORN PULL TRIGGER

2-A, 16-B:C
10-POUND

3-A, 20-B:C
20-POUND

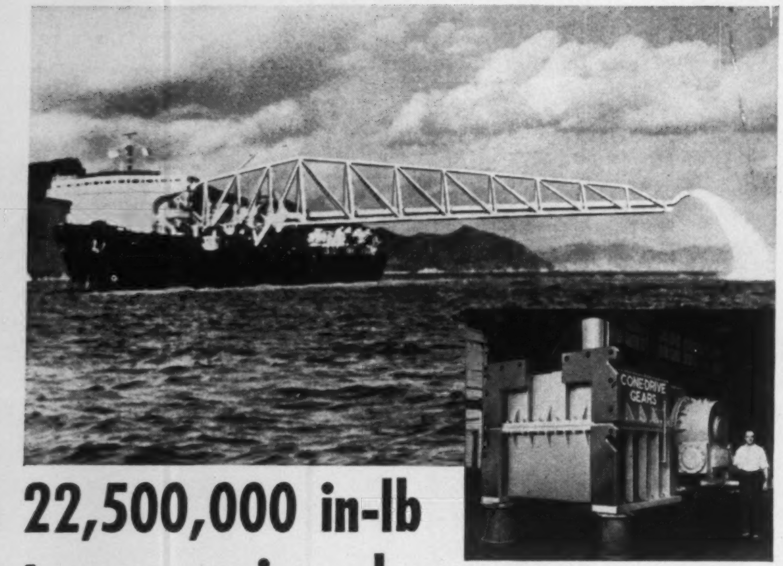
NEW KIDDE TRI-CLASS-ABC UNITS APPROVED FOR A, B, C, FIRES!

U.L.-approved for use on all three classes of ordinary combustibles, flammable liquids, and electrical fires, new 10 and 20-pound Kidde dry chemical portables now simplify the job of fire-fighting, eliminate the possibility of error in matching the extinguisher to the fire hazard. Both make the job of training personnel easier, since they feature simple, two-step operation. Just aim, and pull the trigger... fire is smothered in seconds.

Tops in performance and quality, pressurized Kidde Tri-Class-ABC 10 and 20-pound portables release a powerful, non-turbulent dry chemical stream to insure dependable, fast-acting fire protection. Simple recharging means that once used, your units are quickly put back in service. In addition to full U.L. approval, both units are approved by Factory Mutual Laboratories. For more information on these easy-to-use portables, write to Kidde today!

Kidde

Industrial and Marine Division
Walter Kidde & Company, Inc., 949 Main St., Belleville 9, N. J.



22,500,000 in-lb torque swings boom

This ocean-going dredge "Zulia" has a 437′ discharge boom that rotates 180° to pump waste beyond a channel project's limits. The Cone-Drive speed reducer that does the job is shown in the inset. Due to the **double-enveloping worm** gear principle, this compact housing is capable of producing 22,500,000 in-lb torque—sufficient to "stow away" the giant boom in a 75 MPH wind.

Powerful Cone-Drive worm gearing is available in gearsets, speed reducers and gearmotors.

CONE-DRIVE GEARS
DIVISION MICHIGAN TOOL CO.
7171 E. McNichols Rd., Detroit 12

AGF
ROTARY CARBURIZERS
SEE US AT THE METAL SHOW
EXHIBIT 821

CODE OF ETHICS SIGNER
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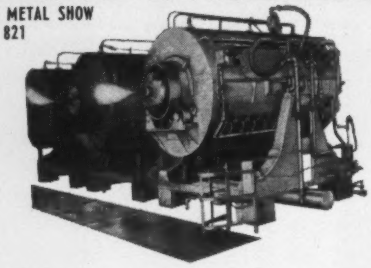
GAS APPLIANCE MANUFACTURERS ASSOCIATION

AMERICAN GAS FURNACE CO.
PIONEERS
1878



AGF's Work in Motion Principle Assures Uniformity of Case!

AGF Rotary Batch Carburizers provide the most reliable method for DEEP CASE CARBURIZING and LIGHT CASE HARDENING.

Recent AGF combustion and control system improvements provide an even greater degree of temperature and product uniformity than was ever before possible.

For POSITIVE COST REDUCTION and PRODUCT IMPROVEMENT, investigate the NEW Improved AGF Rotary Carburizers.

Write for catalog IA 607 today

AMERICAN GAS FURNACE CO. 1004 LAFAYETTE STREET, ELIZABETH, N. J.

tool overhang and increase the ability of tools to take heavier cuts with finer finish and greater accuracy by eliminating long tool sleeves. (Burgmaster Corp.)

For more data circle No. 52 on postcard, p. 207

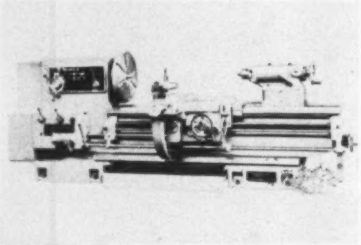
Welding Torch Cup

A special grade ceramic cup, designed with internal and external radii, reduces cup breakage caused by thermal shock and surrounds the electrode with an even gas flow. The design results in more economical Tig welding. The uniform taper on the cups insures positive gripping and eliminates gas turbulence caused by sharp, odd-shaped nozzles. (Falstrom Co.)

For more data circle No. 53 on postcard, p. 207

Bed-Cap Lathe

The swing of a new heavy duty extension bed gap lathe has been increased to 49½ in. for added versatility. New tailstock now standard on the lathe features two direct reading dials for measuring tailstock traverse. One dial records in inches, the other in thousandths of an inch. The dials can be reset to zero at any point in machining. Another new optional feature is a revolving tail-



Problem:

One Straight Cut...

One Miter Cut

Solution:

One MARVEL No. 8 Band Saw

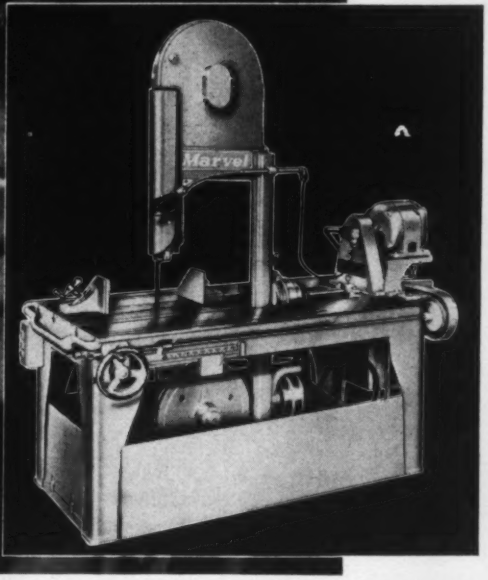
Recently, a Marvel Field Engineer was called on to help solve a troublesome production sawing operation.

He found that a straight cut and a 45° miter cut were required on a 10″ diameter pipe prior to welding it into an assembly. Production was slow, cutting costs were climbing to alarming proportions, and too many pieces were being rejected because one or both cuts were not meeting accuracy standards.

The trouble was easy to find. A makeshift arrangement was being used to do the job. After the straight cut was made, the miter was laid out and the pipe swung out into the aisle so that the saw could make the angle cut. Excessive work handling slowed production, valuable floor space was taken up, and accuracy became increasingly difficult to maintain.

Recommending a Marvel No. 8 Universal Band Saw solved the problem. When the Marvel Field Engineer showed how the Saw's column and blade can be tilted up to 45° right or left of vertical and fed straight into and through the cut at the pre-determined angle *while the work remained stationary on the table*, the production superintendent recognized the answer to his problem. He also saw, how the built-in protractor would eliminate all layout.

Result: another Marvel No. 8 Universal Band Saw went to work for a new user.



Cutting miters quickly and accurately is just one of a hundred jobs that can be done on the versatile No. 8 Universal Band Saw ...the most useful—and used—metal cutting saw on the market. Get complete information on this time and cost saving band saw today. Write for Catalog 875.

Marvel No. 8 Universal
Metal Cutting Band Saw
Capacity: 18″ x 18″

MARVEL *Metal Cutting* **SAWS**

BETTER MACHINES
BETTER BLADES

ARMSTRONG-BLUM MANUFACTURING CO. • 5700 Bloomingdale Avenue • Chicago 39, Illinois

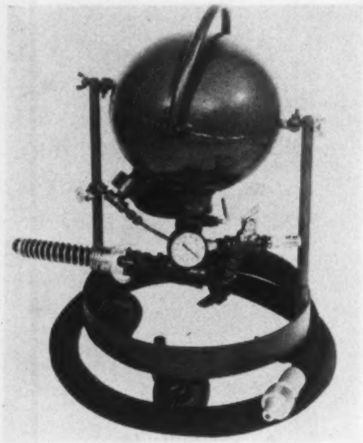
S-1319

stock, featuring anti-friction ball bearing quill, with locking device to lock quill for drilling or tapping operations. The revolving tailstock provides built-in accuracy comparable to spindle precision and incorporates a special device to compensate for heat generated in the workpiece during operation. The revolving tailstock is also available with two-speed feed. (Nebel Machine Tool Corp.)

For more data circle No. 54 on postcard, p. 207

Portable Blaster

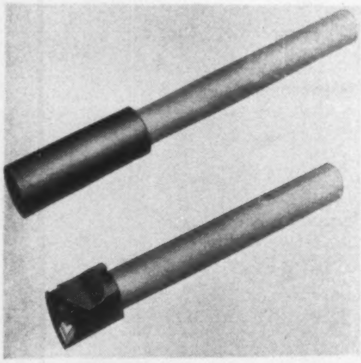
Rugged and lightweight, with low air and abrasive consumption, this little blaster can be carried and operated by one man even in the most inaccessible places for spot repairs to coated surfaces. The blaster can be pulled along on its own wheels or carried by hand. All control-gear swings beneath into a protected position and the machine will roll away by itself if struck accidentally. A special metering valve permits the use of ultra-fine abrasive for etching or woodwork and is adjustable for standard abrasives. (Anderson Mfg. Co.)



For more data circle No. 55 on postcard, p. 207

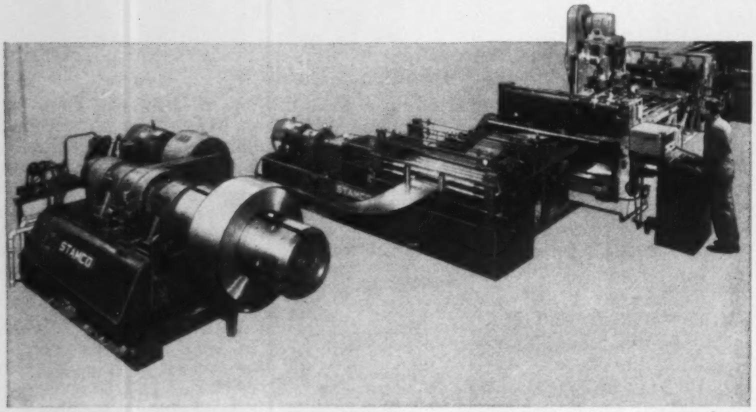
Boring Bars

Semi-finished boring bars, consisting of solid tungsten carbide shanks with heads made of machinable steel for mounting various types of cutting tools, reduce chatter and minimize deflection. The reason: Rigidity of the hard carbide is three times that of tool steel. Better finishes and closer tolerances can be produced with K-bars, often eliminating extra boring and grinding operations to reduce unit costs. K-bars also permit greater length-to-diameter ratios and increases in feeds and speeds. Tool-holding steel heads, brazed on the shanks, are large enough to accommodate any tooling that would be used on each



The answer is **Stamco**

for equipment that reduces cost in slitting and shearing operations



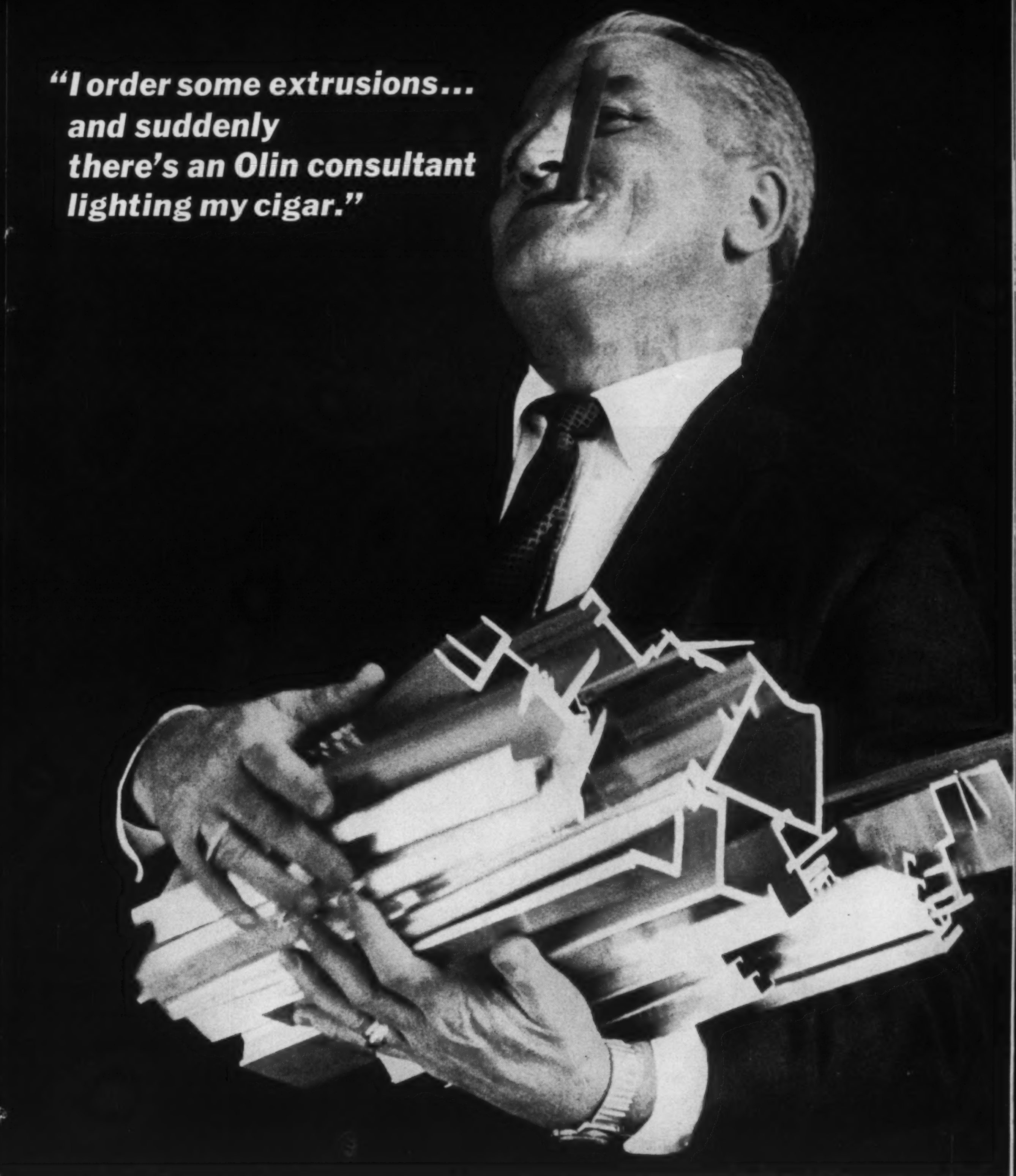
The installation of Stamco equipment will help you realize savings in three important areas: inventory investments, time and labor, and reduced waste.

This new shear line is designed to accommodate stock up to 14 gauge, in widths to 48 inches, and in coils weighing a maximum of 20,000 pounds. Accuracy can be held to plus or minus 1/32 inch. It is set up to cut lengths from 14 inches to any maximum length.

Stamco, Inc.
New Bremen, Ohio, U.S.A.

Slitting and Coiling Lines • Cut-to-Length Lines • Flying Shear Lines • Power Squaring Shears • Continuous Process Lines Ferrous and Non-ferrous Mill Equipment

District Offices, Stamco Sales, Inc.
R. P. Popp, 18450 Livernois, Detroit 21, Michigan
R. P. Popp, 101 Investment Building, Pittsburgh 22, Pa.
I. W. Spraitzar, 159 Main Street, Chatham, New Jersey
W. E. Heineman, 122 West Burlington Ave., LaGrange, Illinois
W. H. Millan, 11955 Shaker Boulevard, Cleveland 20, Ohio



"I order some extrusions... and suddenly there's an Olin consultant lighting my cigar."

"This gentleman walks in with a copy of my extrusion order, lights my cigar and starts talking aluminum, aluminum, aluminum. In short, he's telling me how Olin can save me money by making my dies, giving me better design efficiency in my extrusions. Then he shows me a new welding technique and suggests a brand new market for my product! Who'd think you would ever get service like this from one of America's biggest aluminum producers? Smart people down at Olin. They know how to help a man out where he needs it most."

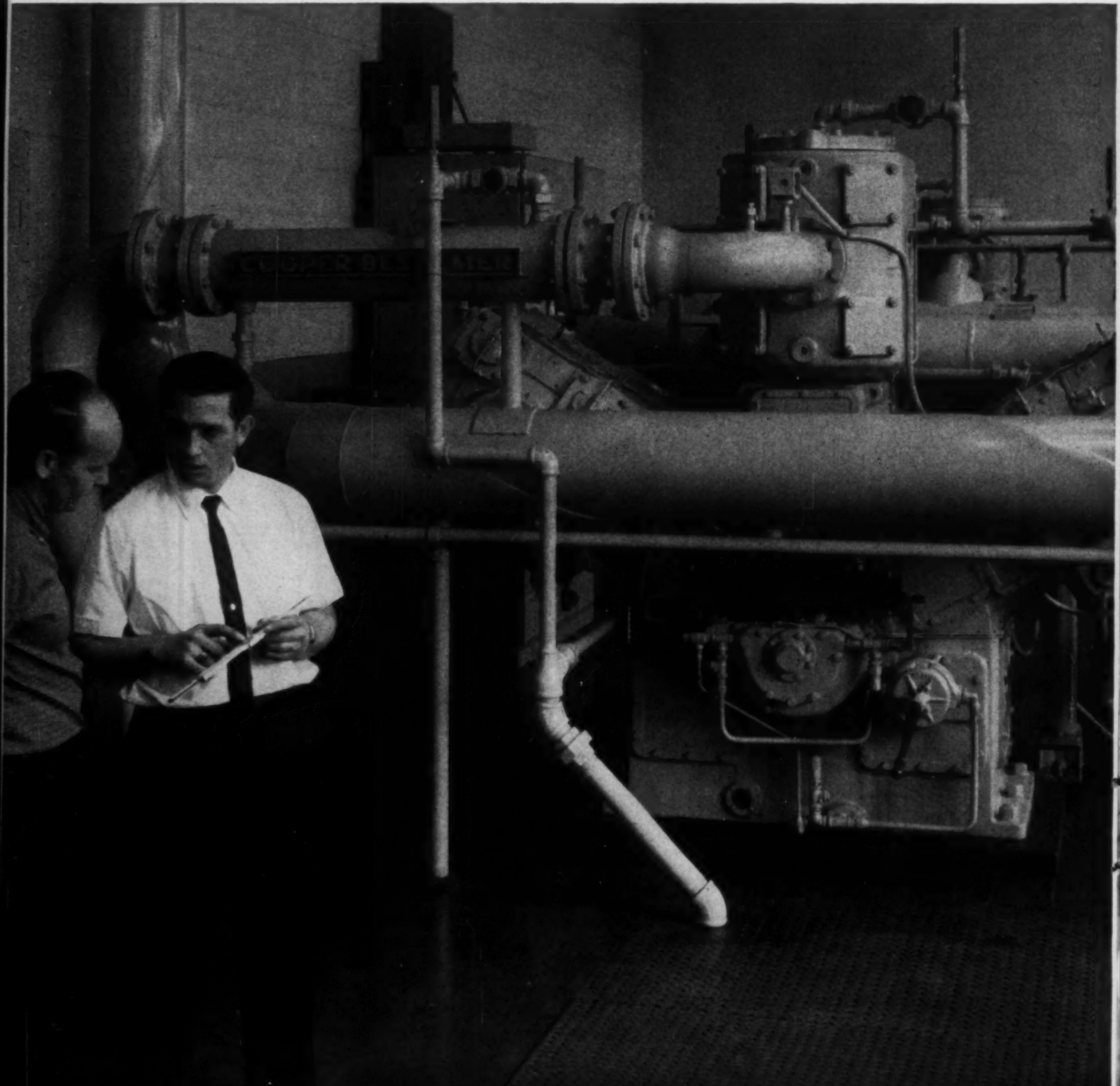
Nobody thinks in aluminum better than Olin. Want to talk to one of our consultants? See the Yellow Pages for our local Sales Office.

Olin
ALUMINUM
400 PARK AVE., NEW YORK 22, NEW YORK

How DMR Air Compressors boost

Users everywhere report important economies by stepping up compressed air capacity with the new Cooper-Bessemer DMR compressors. These *compact,* 720 rpm machines, unmatched in reliability, are enabling plants to boost output with air tools and, at the same time, conserve compressor floor space and installation cost. In most cases, these units can be installed in existing space near the production load to minimize housing and piping needs.

The new DMR compressors are completely



your production...cut floor space needs

equipped with integral motor drive and intercooler ... ready for operation. Their En-Tronic control, also integrally mounted, automatically regulates the compressors to meet the demands of the air system. They are available in 2 or 3 cylinder designs, 150 to 400 hp, 698 to 2005 cfm at discharge pressures up to 125 psi.

For full particulars, call the nearby Cooper-Bessemer office or air compressor agent. Write for Bulletin 94 on the new DMR line.

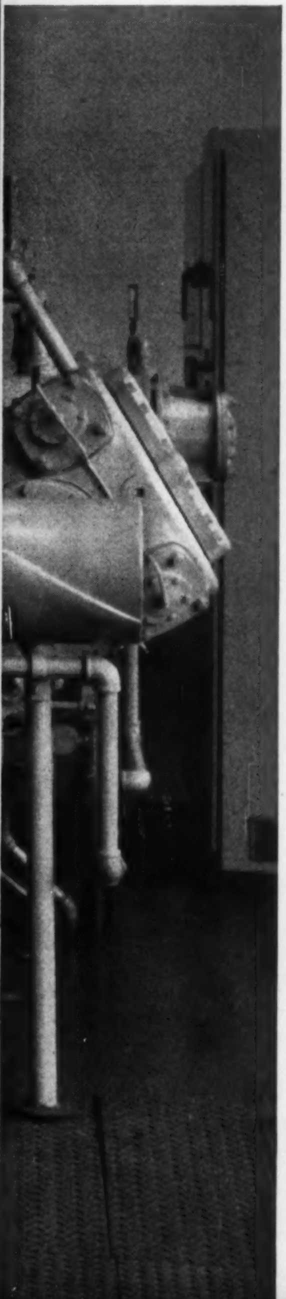
BRANCH OFFICES: Grove City • New York • Washington • Gloucester Pittsburgh • Mount Vernon • Detroit • Chicago • Minneapolis • St. Louis Kansas City • Tulsa • New Orleans • Shreveport • Houston • Greggton • Dallas Odessa • Pampa • Casper • Seattle • San Francisco • Los Angeles

SUBSIDIARIES AND DIVISIONS: Cooper-Bessemer International ... New York • Cooper-Bessemer, S. A. ... Chur, Switzerland • The Hague, Netherlands • Buenos Aires, Argentina • Anaco, Venezuela • Caracas, Venezuela • San Juan, Puerto Rico • Cooper-Bessemer of Canada, Ltd. ... Edmonton • Calgary • Toronto • Halifax • Stratford • Cooper-Bessemer Mexicana, S.A. ... Mexico City • The Rotor Tool Company ... Cleveland C-B Southern ... Houston • The Kline Manufacturing Company ... Galena

Cooper-Bessemer

GENERAL OFFICES: MOUNT VERNON, OHIO

COMPRESSORS: RECIPROCATING AND CENTRIFUGAL
ENGINES: GAS · DIESEL · DUAL-FUEL
JET-POWERED GAS TURBINES



IN A ◀ FOUNDRY

... This Cooper-Bessemer DMR-3 air compressor delivers 1658 cfm for portable tools in a Pennsylvania foundry.

IN A FABRICATING ▶ PLANT

... This Cooper-Bessemer DMR-2 compressor supplies 757 cfm air at 125 psig pressure for portable tools.

COMPLETE INFORMATION ▶

on the new line of compact DMR compressors is given in this booklet ... free on request. Ask for Bulletin 94.

LONG TURNINGS
reduced by
American Crusher
to
Shovelling Chips
Produce
GREATER PROFITS

American Metal Turnings Crusher

... increases profits ... improves handling

An almost fully automatic chip salvage system, with an American Metal Turnings Crusher at its heart has increased profits, saved space, and improved housekeeping at a ball bearing plant, conveyors service two rows of automatic screw machines and feed a cross-over conveyor. The cross-over conveyor feeds turnings directly into an American Metal Turnings Crusher which reduces the turnings to uniform sized chips. From the crusher chips are conveyed to a hopper to be periodically discharged into a chip-wringer to reclaim cutting oil. Dry chips drop into a discharge hopper and feed into an air duct which pneumatically conveys the chips to a storage bin at the rail siding.

Literature on American Metal Turnings Crushers is yours for the asking.

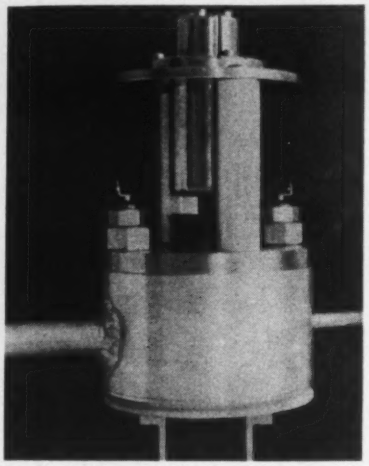
American PULVERIZER COMPANY
ORIGINATORS AND MANUFACTURERS OF RING CRUSHERS AND PULVERIZERS
1439 MACKLIND AVE. ST. LOUIS 10, MO.

size of bar. Ten sizes of semi-finished K-bars, ranging from 7/16 to 2½ in. in bar diameter and from 7⅝ in. to 28¼ in. in overall length, are available. Heads, made of 28-32 Rockwell C steel, are ¾ to 4⅝ in. in diameter and 1 15/16 to 9⅝ in. long. Bars of ¾-in. shank diameter and larger have coolant holes longitudinally through their centers. (Kennametal, Inc.)

For more data circle No. 56 on postcard, p. 207

Electron Beam Gun

A new electron beam gun has been developed for welding refractory and reactive metals. The gun can be operated in standard stainless steel bell jars or in larger chambers for production work. The gun is self accelerated and incorporates electrostatic deflection for moving the beam electronically within a 3-in. circle. The gun is rated at 20 kv, 5 kw and can be used for evaporation in thin film deposition, button melting and zone refining. (High Vacuum Equipment Corp.)

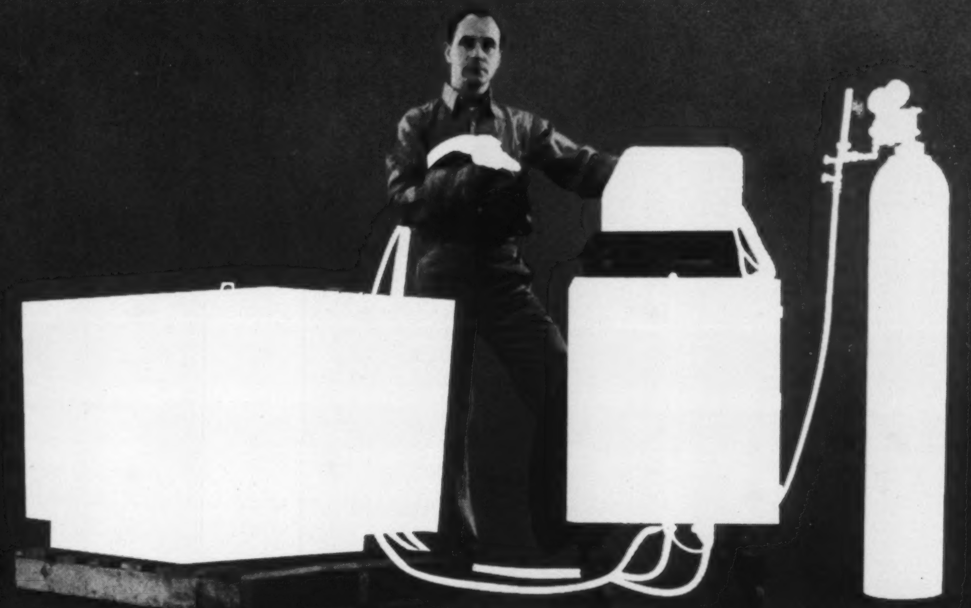


For more data circle No. 57 on postcard, p. 207

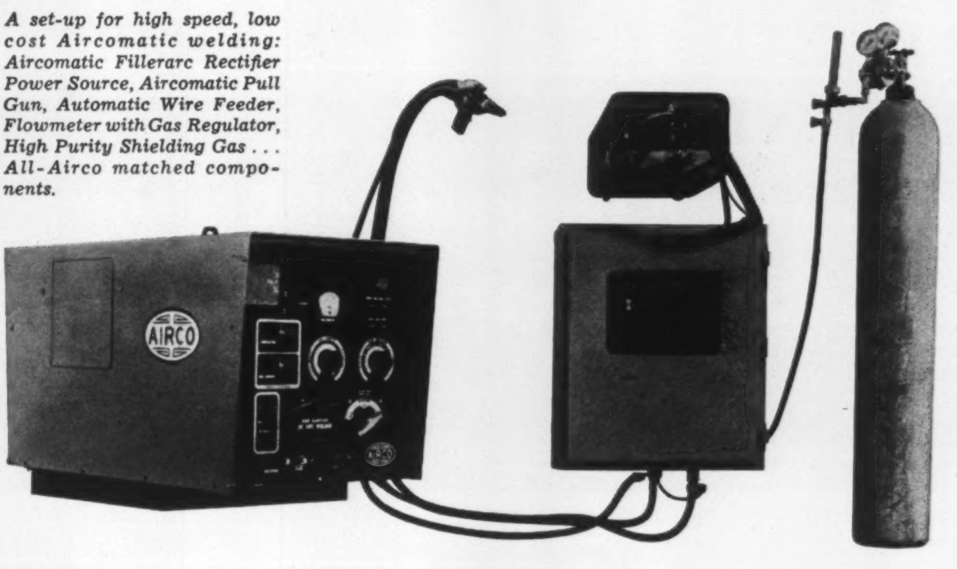
Precision Grinder

Four feet longer than standard models, a special internal grinder is shaping the bores and faces in precision machine tool spindles and similar workpieces. Each workpiece is driven by a six-jaw chuck at the workhead end of the machine. A steady-rest supports the opposite

WHEN YOU USE GAS-SHIELDED METAL ARC WELDING



ONLY THE AIRCOMATIC® LINE GIVES YOU EVERYTHING YOU NEED



A set-up for high speed, low cost Aircomatic welding: Aircomatic Fillerarc Rectifier Power Source, Aircomatic Pull Gun, Automatic Wire Feeder, Flowmeter with Gas Regulator, High Purity Shielding Gas . . . All-Airco matched components.

Aiming to weld jet engines? . . . Rock crushers? . . . Whole trains of aluminum gondola cars? . . . Auto body frames? . . . mild steel, stainless, copper alloys or metals of the future?

Do it the Aircomatic way! You can weld it up to 7 times faster, and still turn out top quality welds!

How is this possible? Airco's range of equipment is unequalled anywhere. As a result you get matched components which fit precisely the specialized demands of your job.

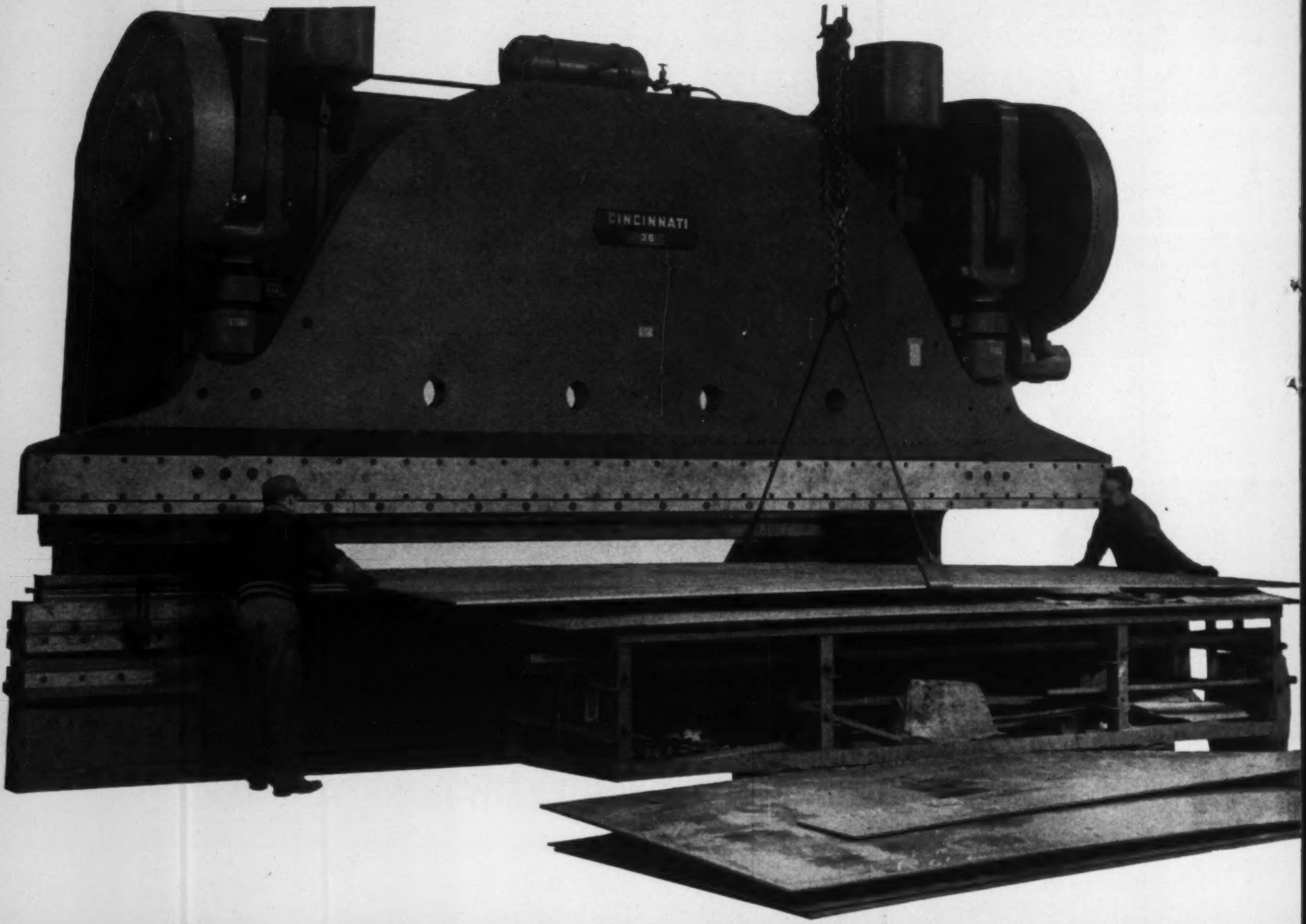
Specifics: The Airco Pull Gun handles small diameter wires with the highest precision of all semi-automatics. The Aircomatic Wire Feeder gives you the finest wire feed speed control. The Aircomatic Fillerarc Rectifier gives you the ultimate in versatility and performance.

For top dollar savings in fabrication here's the No. 1 line in the gas shielded metal arc welding business. Call Airco . . . where the big idea is teamed with unexcelled experience!

AIRCO®

AIR REDUCTION SALES COMPANY
A division of Air Reduction Company, Incorporated
150 East 42nd Street • New York 17, N. Y.
More than 700 Authorized Airco Distributors Coast to Coast

On the west coast—Air Reduction Pacific Co., **Internationally**—Airco Co. Int'l., **In Canada**—Air Reduction Canada Ltd. • All divisions or subsidiaries of Air Reduction Co., Inc.



CINCINNATI® PRESS BRAKE

gets new business

Bigger jobs, fewer welded seams, less handling, and easier operation—McGregor-Michigan Corporation gets all four advantages from this 36 Series Cincinnati Press Brake.

As a result, "this new brake . . . helps us be more competitive with some of the larger shops," says R. Hilprecht, sales manager of this steel plate fabricating shop.

This is another example of the way Cincinnati Press Brakes and Cincinnati Shears are reducing costs and opening up new business for shops across the country. If you don't have the new catalogs on these machines, both mechanical and hydraulic, please write for them.

Shapers / Shears / Press Brakes

THE CINCINNATI SHAPER CO.

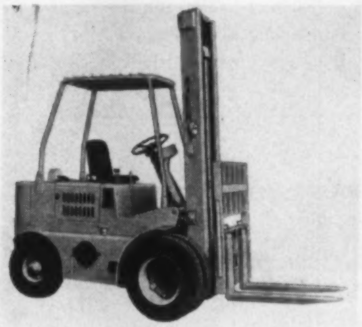
Cincinnati 11, Ohio, U.S.A.

United Kingdom: The Cincinnati Shaper Co., Ltd., Glasgow, Scotland end of the work in process. Both the steady-rest and the workhead are supported on and positioned by two parallel ground ways. A third parallel way is furnished for mounting gaging equipment. This special grinder swings parts up to 16 in. in diameter and grinds holes up to 9-in. deep. Tapers up to a 30° included angle can be ground. When a special spindle is supplied, extra-long workpieces are easily handled. (Bryant Chucking Grinding Co.)

For more data circle No. 58 on postcard, p. 207

Heavy-Duty Fork Truck

Standard power steering and full instrumentation are just two features of a new 6000-lb capacity fork-lift truck. Dual-drive pneumatic tires provide solid traction and high stability. Exclusive wide-angle steering and standard power steering permit tight turns and exceptional maneuverability. Heavy-duty air filters stand up against dusty-area operation. The truck's rubber-mounted trail axle requires no lubrication. (Otis Elevator Co., Baker Industrial Truck Division)



For more data circle No. 59 on postcard, p. 207

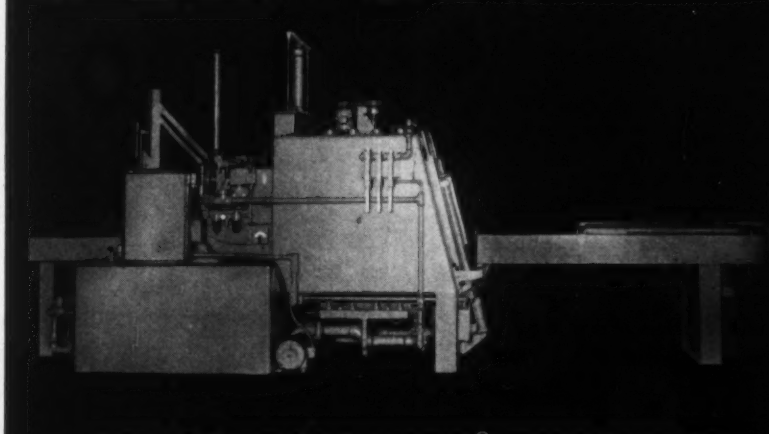
New Chance for Coal?

After three years of development, a "packaged" coal-fired boiler is now available for industrial and commercial use. The unit combines boiler, stoker, combustion-control regulators, coal conveyor and ash conveyor into one automatic system. Here's how it operates. At the suggestion of a bin-level control, coal is picked up and transferred to a storage hopper at the front of the boiler. It stays there until controls attached to the steam or hot-water lines signal the stoker to feed more fuel. When boiler needs are met, the electronic controls say, "Enough." The equipment slows down and then stands by until more fuel is needed. Also of interest is the fact that combined with a convertor, the system serves as an air-conditioning unit in the summer. (Canton Stoker Corp.)

For more data circle No. 60 on postcard, p. 207

Monitors Machines

Desk-top size notwithstanding, this new device monitors and records the status of up to 40 production or data-processing machines. Known as the Bar Chart Recorder, this unit operates away from production areas to provide cost- and production-control data on a continuous bar chart. This readout places at management's fingertips an accurate graphic picture of each machine's productive and nonpro-



NEW from Sunbeam

AF CASEMASTER® FURNACE

for atmosphere controlled carburizing—carbonitriding—hardening—annealing—carbon restoration up to 2000° F.

these features will increase your production and lower your operating and maintenance costs!

- Maximum production from straight-through work movement.
- Heat treats many types of work over broad temperature range.
- Fewer rejects from thorough penetration of heat and atmosphere.
- Automatic control minimizes human error.
- Radiant tubes can be easily replaced.
- No moving parts of work transfer system are exposed to excessive heat in furnace.

See The Sunbeam Casemaster Furnace Demonstrated
At The Metal Show, Detroit, Oct. 23-27
Booth 721

Sunbeam

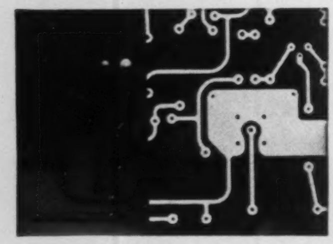
®SUNBEAM, CASEMASTER

The best Industrial Furnaces Made
SUNBEAM EQUIPMENT CORPORATION
200 Mercer Street, Meadville, Pennsylvania

Straits Tin Report

Chemical tinning enhances the solderability of the conductive paths of printed circuits. Pure tin is deposited only on metal surfaces, including exposed edges; dielectric properties are unchanged.

The new process, using "CUPOSIT LT-26," made by Shipley Co., Inc., Wellesley, Mass., is not a substitute for electrodeposited tin, but it affords protection to the printed circuit board, thereby increasing storage life. "CUPOSIT LT-26" operates at temperatures lower than hot tin dipping, requires no electricity, contains no cyanide.



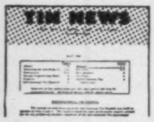
Bright side of printed circuit shows results of immersion in new chemical tinning process.

Tin Developments

- *Stronger titanium* results from addition of 15% tin. Ultimate tensile strength increases 90% at room temperature.
- *High-temperature brazing filler* metal alloys of tin, nickel, chromium, silicon keep joints strong after long exposure at high temperatures.
- *Low-melting quaternary* alloys of tin, indium, lead, silver are used for cryogenic circuits.

Free Bulletin

Write today for a free subscription to TIN NEWS—a monthly bulletin on tin supply, prices and new uses.



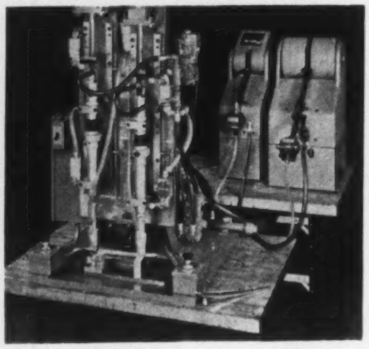
The Malayan Tin Bureau
Dept. T-54K, 2000 K St. N.W., Washington 6, D.C.

ductive effort. Every 20 seconds, the recorder samples and records performance. If a machine is operating, that fact is registered with a short horizontal line in the appropriate area on the chart. Lines do not appear if the machine is idle. Basic recorder units are a rotating drum, a stylus and an inkless chart. Wires connect to each machine. (Electronic Associates, Inc.)

For more data circle No. 61 on postcard, p. 207

Stud Driver

This newly designed Tru-Tork machine automatically feeds, orientates and drives different size self-tapping studs into a casting. This method of operation cuts the assembly time in half. The right-hand driving head drives a 10-24 x 1 in. self-tapping stud into a die-cast fender ornament. The left-hand head feeds a 10-24 x 2 in. self-tapping shoulder stud through the die casting and into a die cast aluminum ball. When driven into this ball the shoulder of the stud seats tightly against the die casting. One unique feature is that this hopper fed machine drives from the thread. (Clyde Engineering and Mfg. Co.)



For more data circle No. 62 on postcard, p. 207

Tests Grinding Wheels

This electronic device tests the hardness and uniformity of a grinding wheel while it's rotating. Test results are recorded on a permanent tape. This readout helps wheel man-

Handling Coil Stock?

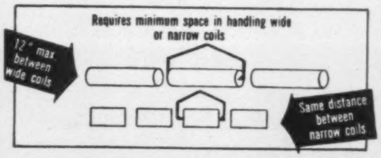
CHECK THESE

C-F LIFTER

ADVANTAGES

- 1 Lifter handles wide range of coil sizes
- Requires minimum of only 10" to 12" between piles —saves storage room
- 1 man operation — eliminates hookers
- Positive grip on coil — no damage to material

• C-F Coil Lifters are saving time and labor in many plants and warehouses because they can pick up, carry and set down a coil of steel faster and safer than any other method. Infinite jaw openings permit handling a very wide range of coil widths . . . carrying legs open fast, stay open until operator closes them on coil. Narrow legs require minimum space between piles – a space saving advantage. Made in motorized models for crane cab or pendant operation as well as manual types with chain wheel, in capacities from 3 tons up. Powered Rotating Heads available. Opening ranges to suit your requirements. Write for illustrated Bulletin.


Requires minimum space in handling wide or narrow coils
12" max between wide coils
Same distance between narrow coils

CULLEN-FRIESTEDT CO.
1303 South Kilbourn Avenue • Chicago 23, Illinois

stainless

because no other
metal will do
the job as well—

stronger
handsome
ever-bright
non-corrodible
easy to clean

thanks to

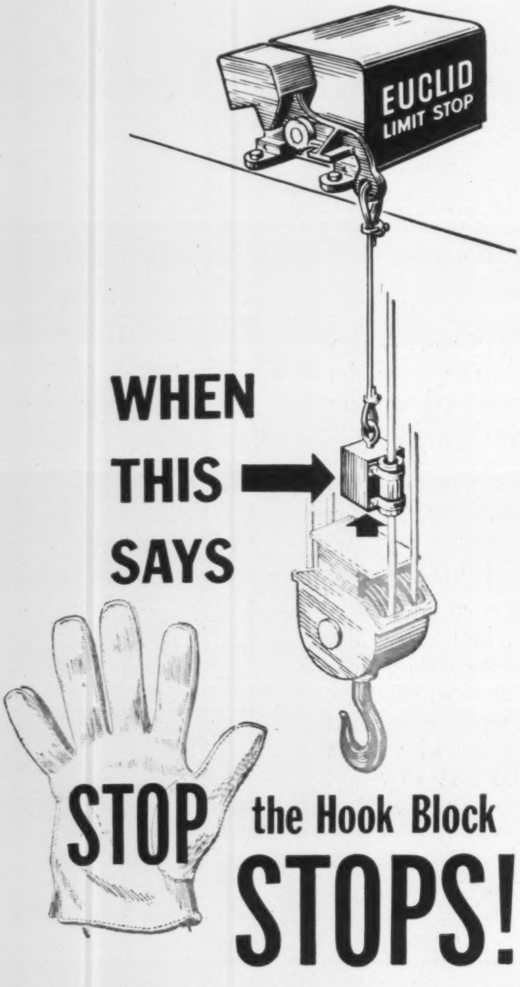
Superior

STAINLESS STRIP STEEL

Your fire extinguisher with the stainless body features a very good reason for being ever-ready for service: stainless steel is the *changeless* metal — good as new, year after year, without costly maintenance. • Made of SUPERIOR Stainless Strip Steel, the extinguisher body is easy to draw and weld—always uniform in behavior and performance because of uniformly Superior quality, coil after coil. Let us quote on your stainless requirements.

SUPERIOR STEEL DIVISION
OF
COPPERWELD STEEL COMPANY
CARNEGIE, PENNSYLVANIA

For Export: Copperweld Steel International Company, New York



WHEN THIS SAYS

STOP the Hook Block STOPS!

Safe

No danger of overhoisting disasters (particularly damage to the trolley frame or hoisting mechanism) when it's EUCLID.

Simple

Tripping and reset weights do the job. Positive trigger action is assured when it's EUCLID.

Sure

Because this Crane Power Safety Limit Stop is EUCLID designed, tested, engineered and field proved.

For more information about this heavy-duty, smaller in size, lighter in weight Limit Stop, ask for Bulletin 2130.

We specialize in designing the control system best suited to your individual needs. Our services are yours for the asking. **CUSTOM ENGINEERING IS OUR BUSINESS. WHAT'S YOUR PROBLEM?**

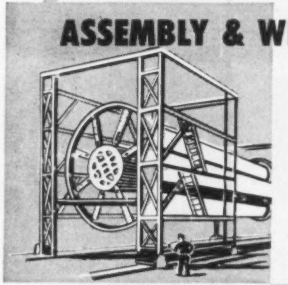
EX-29

The EUCLID Electric & Mfg. Co.
Dept. B • MADISON, OHIO

PROGRESSIVE WELDER & MACHINE CO.

DESIGNERS & BUILDERS OF FINE EQUIPMENT FOR OVER 25 YEARS

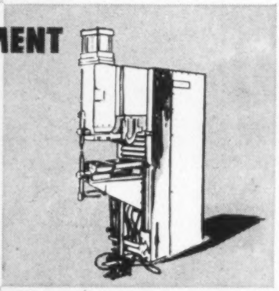
ASSEMBLY & WELDING FIXTURES



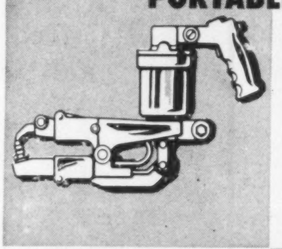
We have the facilities and ability to design and build all types of special fixtures, from mammoth space craft assembly units to tiny precision welding set-ups.

WELDING EQUIPMENT

We offer a complete line of standard and special resistance and arc welding machines. Standard of efficiency and dependability for over 25 years.



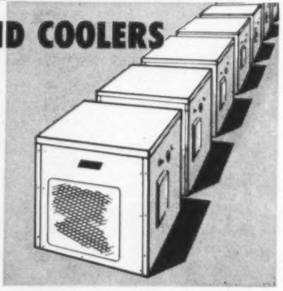
PORTABLE WELDING GUNS



Our standard-chassis hydraulic or pneumatic guns with interchangeable jaw extensions, adaptors, and tips afford thousands of specialized applications at lowest cost.

INDUSTRIAL LIQUID COOLERS

Economical, compact, efficient, low maintenance "packaged cooling" units for tool coolants, hydraulic oils, welders, temperature control systems, delicate instruments and specialized uses.



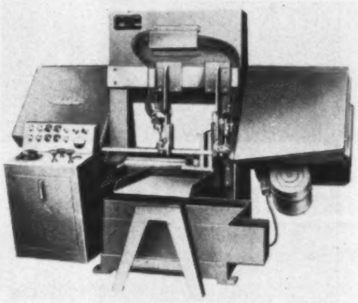
***PROGRESSIVE* WELDER & MACHINE CO.**
915 Oakland, Pontiac, Mich.

ufacturers improve the quality of their product. Users of grinding wheels find the tape record useful for quality-control inspection of their production grinding. In operation, the testing device passes a conical steel cutter across the face of a moving wheel. This cutter crushes small amounts of abrasive from the wheel's surface. In the process, it precisely measures the force required. (Macklin Co.)

For more data circle No. 63 on postcard, p. 207

Heavy-Duty Band Saws

Here are two new models of heavy-duty band saws. Both are designed for high-speed cutting with HS or carbon steel blades. One has a cutting capacity of 14 x 18 in. the other 24 x 24 in. Both are fully hydraulic and automatic. The saws feature a new self-contained variable-speed drive unit which operates with conventional friction-type speed changes. A quick action vise changes for up to 45° angle cuts. The units are powered with a 5-hp-blade motor and claim a coolant capacity of 7 gal. (W. F. Wells & Sons, Inc.)



For more data circle No. 64 on postcard, p. 207

Respirator Adds Safety

Economy and a higher degree of worker acceptance are just two of the many benefits of a redesigned custom Comfo respirator, which now features an improved facepiece peripheral seal. The advanced seal, including an inturned lip and deep chin cup cushion supported by a four-point floating suspension system, provides for a greater range of

trim the cost of trim painting!

fast and fancy finishing when you use masking

TAPES FROM 3M

The Harley-Davidson Motor Co. chooses masking tapes from 3M to speed much of the decorative trim painting on their products. Curved surfaces . . . complicated designs . . . the need for perfect results make "Scotch" Brand Masking Tapes especially desirable. These tapes from 3M conform easily . . . stick at a touch . . . remove cleanly and easily . . . leave no adhesive residue.

TRY THIS METHOD. See how it speeds finishing operations and improves results. Ask your 3M Representative or nearest "Scotch" Brand Tape Distributor for a demonstration, or write: 3M Co., 900 Bush Ave., St. Paul 6, Minn., Dept. IBU-101.

REG. U.S. PAT. OFF.
SCOTCH BRAND
tapes for industry

MINNESOTA MINING AND MANUFACTURING COMPANY
...WHERE RESEARCH IS THE KEY TO TOMORROW
3M COMPANY

"SCOTCH" IS A REGISTERED TRADEMARK OF 3M CO., ST. PAUL 6, MINN.

Allison-Campbell

ABRASIVE CUTTING KNOW-HOW

This 12-inch billet was cut in 14 minutes!

This speed is standard procedure with CAMPBELL wet abrasive cutting machines. The 14-minute example refers to a semi-finished carbon steel billet, but it's just as true for other metals. Even Rene 41 and Inconel X can be cut at 7 to 10 square inches per minute.

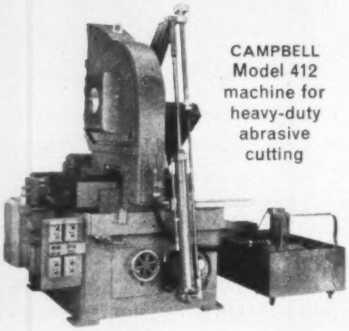
You get top quality, too • No burn, a surface suitable for metallurgical examination, and dimensional accuracy with modern abrasive cutting techniques.

The most economical way to cut • It's not uncommon to reduce cutting time from hours to mere minutes with CAMPBELL machines. Wheel cost is low, too.

Machines for heavy-duty jobs • ALLISON-CAMPBELL offers a wide selection of precision abrasive cutting machines. For the *big* jobs, the recommendation usually is either the CAMPBELL Model 481, with capacity up to 8″ squares, or the CAMPBELL Model 412, which can cut 12″ squares. Both of these machines have a unique coolant system for greater accuracy, better-quality cuts. Oscillation (the backward and forward motion of the wheel as it cuts through the work), speeds up production, increases wheel life.

For other cut-off jobs, there are four types of CAMPBELL machines in both wet and dry cutting models, with capacities and speeds to suit your own production needs. ALLISON-CAMPBELL also can supply the right wheels for any cut-off job.

Write for details. *For on-the-spot help, call in your* ALLISON-CAMPBELL *field engineer. He's an abrasive cutting specialist, ready to give expert advice.*



CAMPBELL Model 412 machine for heavy-duty abrasive cutting

Send us a sample

Send us samples of the materials you cut. We will make test cuts in our Abrasive Cutting Laboratory and return the samples to you with complete test data.

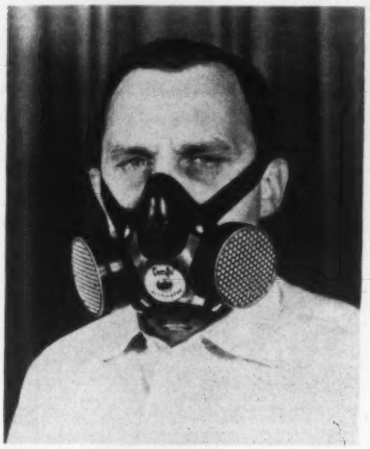
ACCO

CAMPBELL ABRASIVE CUTTING MACHINES

Allison-Campbell Division • American Chain & Cable Company, Inc.

927 Connecticut Avenue, Bridgeport 2, Conn.

facial shapes and sizes. This minimizes the need for a full facepiece in areas of "nuisance" concentrations of contaminants or toxic dusts.

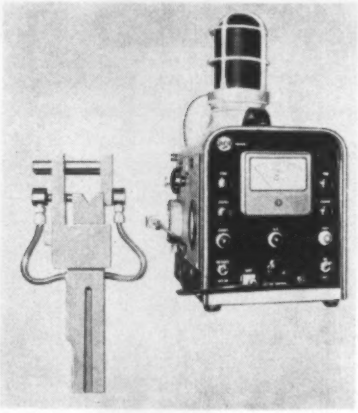


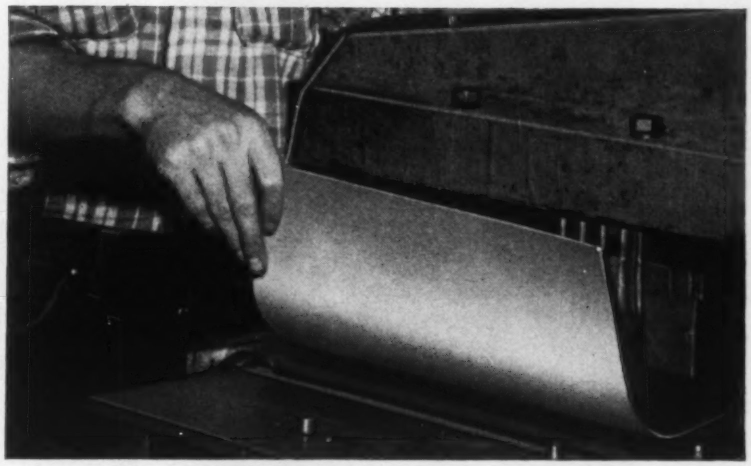
Approved by the U. S. Bureau of Mines, the half mask is also employed as a component part of similar dust, chemical cartridge, and air line respirators. (Mine Safety Appliances Co.)

For more data circle No. 65 on postcard, p. 207

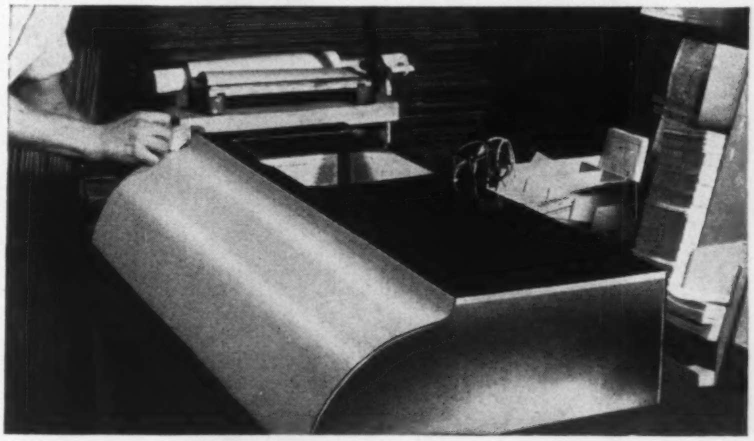
For Centerless Grinders

This low cost gage consists of an RCA limit signalling comparator, which operates on air-electronic principles, and a gaging station fixture with twin air jets on a "v" block which is mounted to the end of the centerless grinder rest blade. Parts leaving the grinder enter the fixture and pass between the opposing air jets. The increase or reduction of the air flow caused by part-diameter variations is translated into





from die to delivery
with no repolishing!



metal formed without a scratch
when covered with protective

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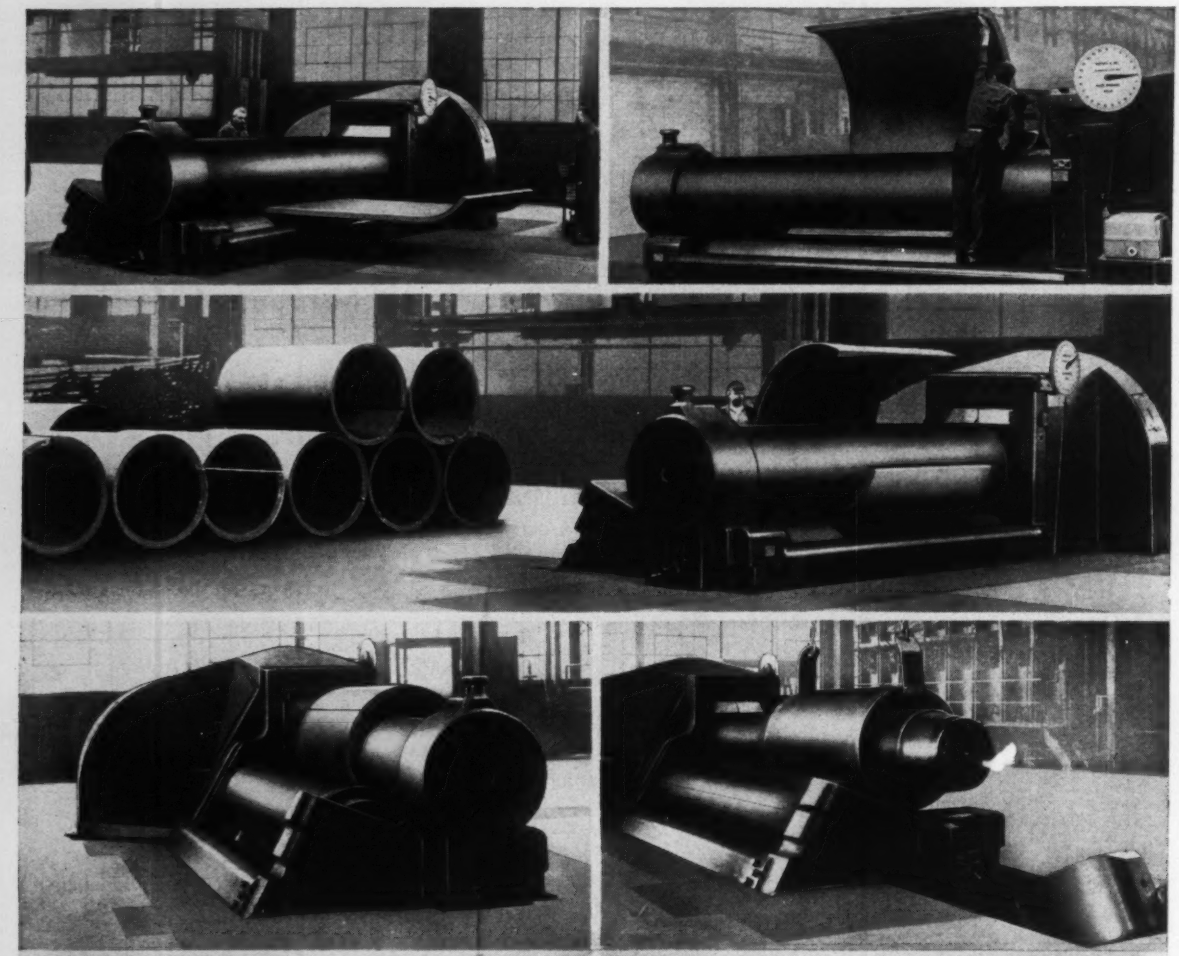

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BERTSCH & COMPANY

CAMBRIDGE · CITY INDIANA

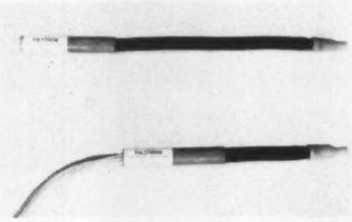
Advertisers in the Iron Age since 1879

a signal that actuates a meter and signal lights. The large warning light on top of the unit and the upper and lower limit lights on the front panel of the comparator warn the operator that parts out of preset tolerances are being produced. A green light on front of unit flashes as acceptable parts are gaged. Since limits can be set well within the allowable tolerances, the operator is alerted and can make grinder corrections before actual rejects occur. (Radio Corp. of America)

For more data circle No. 66 on postcard, p. 207

Flexible Welding Torch

A new controlled-angle flexible Tig welding torch features a 9-in. body of molded neoprene. The torch is ideal for extremely hard-to-reach recesses and seemingly impossible angles. (Falstrom Co.)



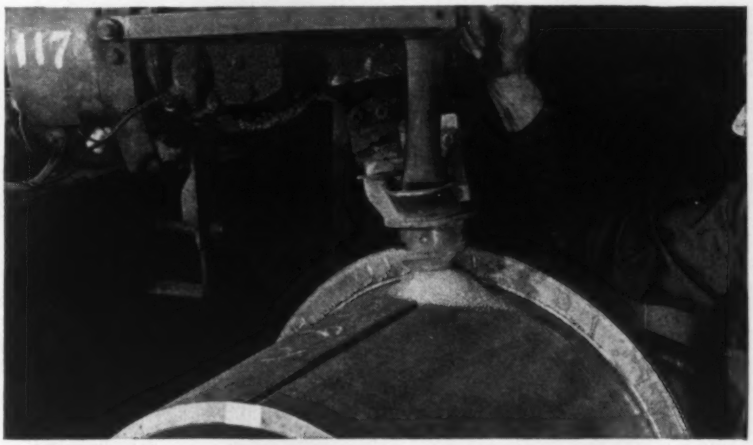
For more data circle No. 67 on postcard, p. 207

Hydraulic Press

Weighing in at about 500,000 lb, a new press is rated at 41,000 tons capacity for forming missile and aircraft parts. On test runs, this giant delivered a whopping 63,000 tons of forming capacity. A fluid cell, mounted on top of the pressure cylinder, provides the forming pressure. This cell is inflated with hydraulic fluid. Then the forming pressure acts on metal blanks which are arranged on a tray. As the fluid cell expands, it fills the unoccupied area within the cylinder. This action shapes the metal blanks around forming blocks. A master control console with two auxiliary stations regulates all press actions. Less than two minutes are required to complete each forming cycle. (Verson Allsteel Press Co.)

For more data circle No. 68 on postcard, p. 207

flux stays put...
air stays out!



smoother welds every time when back-up tool is glass cloth

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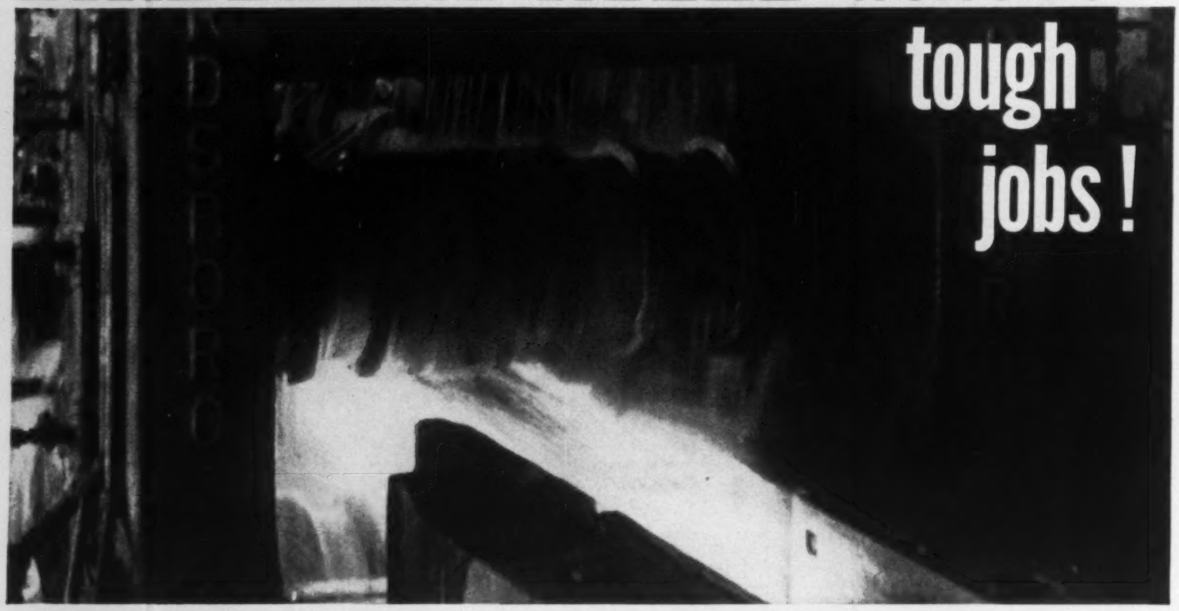

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Auto Strikes Stall Steel Upturn

Effects of the GM strike are still to be felt. And the pattern is being repeated at Ford.

Auto setbacks tend to overshadow other market strength. Defense orders start to show up.

▪ October has to be written off as a major recovery month in steel production. Auto strikes, first at General Motors, then at Ford, lost too much production to be made up by increases in general business.

To aggravate the auto strike situation, General Motors has not scheduled expected overtime to compensate for lost time. It had been expected that the end of the GM strike would see an all-out assault on auto production records. This has not materialized.

Steel Held Up—At the time of the GM strike, the automaker told steel suppliers to hold up on shipments, but not production. Now, the unshipped steel is making up a large portion of the automaker's steel requirements for October.

The result is a big hole in what steelmakers had confidently expected would be total October business. To make matters worse, the pattern is being repeated at Ford where the costly shutdown went into its second week.

The big hope now is that auto sales will show a sharp jump and automakers will revise their present order pattern. If they don't, there will be reluctance to overstock dealers for the winter. But if sales of the 1962 models take off, steel requirements will get a fast reappraisal and the year could end on a good uptrend.

Strong General Demand—Except for automotive, the general demand for steel is there, the magazine says. Appliances are coming into seasonal strength and are taking good tonnages. Even without automotive support, delivery promises on cold-rolled sheet are lengthening in some areas, particularly the Midwest. The heavy steel market is also strong, again with the Midwest showing up best.

One of the largest steel producers, with a broad enough base to avoid automotive domination, reports that the last week in September was the best for orders since June. At this mill, opinion is that customers have come out of a lethargic period.

In some areas, November is running ahead of October and December is out in front of November for comparable periods. Tonnage involved this far ahead is small, but the slight bulge in November comes from automotive sources and may be significant.

Defense Orders — For the first time, defense orders are showing up in more than token tonnages. Defense-rated orders for shell-quality bar stock up to about three in. in diameter are noted in the East and in Ohio. Wire and rod mills are also getting orders for small diameter stock for small arms ammunition.

The trend for more defense business is getting stronger each week and may be a sleeper in a stronger market later this year. Defense will certainly add pressure to the market in the first months of 1962, just at the time when users start thinking about hedging against steel labor negotiations.

District Steel Production Indexes 1957-59=100

	Last Week	Two Weeks Ago	Month Ago	Year Ago
North East Coast	108	113	115	98
Buffalo	104	103	100	27
Pittsburgh	109	107	98	69
Youngstown	101	100	98	80
Cleveland	143	148	125	99
Detroit	123	147	136	103
Chicago	114	114	111	87
Cincinnati	124	129	122	88
St. Louis	119	114	101	105
Southern	106	108	108	69
Western	119	115	109	86
U. S. Index	112.8	114.4	109.1	81.7

Source: American Iron & Steel Institute

Steel Production, Composite Prices

Production	Last Week	Two Weeks Ago	To Date 1961	To Date 1960
(Net tons, 000 Omitted)	2,102	2,131	72,551	81,323
Ingot Index				
(1957-59=100)	112.8	114.4	97.4	109.1
Composite Prices	This Week	Week Ago	Month Ago	Year Ago
Finished Steel base (Cents per lb)	6.196	6.196	6.196	6.196
Pig Iron (Gross ton)	$66.44	$66.44	$66.44	$66.41
Scrap No. 1 hvy (Gross ton)	$39.17	$39.17	$39.50	$29.83
No. 2 bundles	$26.17	$26.17	$26.17	$20.17

PURCHASING

Electronic Field Moves Fast

Buying computer "systems" rather than "units" catches on. Prices are erratic and vendors under pressure.

And the Air Force proposes new types of contracts.

▪ Pros in electronics buying point to four developments in the field that bear watching:

Buying of computers is swinging over to "systems" purchasing, rather than "unit" purchasing.

Air Force "reward-penalty" contracts are in the works and soon due.

Erratic price patterns rule and call for careful "shopping around."

Some electronic suppliers are running into "red ink" trouble. This means buyers must be on their toes in seeking assurance of "continuity of supply."

Single Source—Ideas on how to buy computer systems are gradually changing, say many veteran observers. Until lately, it has been common practice for companies to buy computers from one source, computer control systems from another.

Now there is talk by some segments of industry urging "single supplier responsibility" for industrial control systems built around computers.

The reason? Over the long haul it is theorized that money is lost through inefficiency of the overall system when it is bought from several sources.

The approach is not wholly accepted but some users concede more money can be saved with an integrated system.

Manufacturers, in some cases, go along with this thinking. They concede cash savings and reliability can result. They point out that a manufacturer is more willing to take responsibility when he has sold the entire system. If he gets the entire job he can turn out a more efficient total system.

TOUGH JOBS MADE EASY: Electronically-operated test stand evaluates transmission parts (foreground) at Ford Motor Co. research center.

New Contracts — Viewed with great interest by electronics producers is a recent Air Force proposal to allow larger profits for companies that come up with better ways to cut costs on future military contracts.

This policy would allow rewards for good showings with corresponding penalties when a poor job is done.

Possibly, this would put more pressure on buyers under these contracts. As of now, no contracts have yet been awarded under this plan.

One thing to be stirred is said to be buyer interest in value analysis. The Air Force uses this concept and feels it is a key approach to measurable savings.

Price Moves—Sales of electronic items have been running ahead of last year but some price depressions obscure this trend. This is true in the case of semiconductors. In the first quarter semiconductor shipments rose 15 pct over year-ago levels. But dollar volume was up less than 2 pct.

Prices have a way of moving up and down in the trade and no set pattern has been developing. Here are examples:

General Electric hiked prices of voltage regulators sold to utilities by 5 pct. The raise was blamed on a current decline in profit margins.

Meanwhile, Westinghouse Electric Corp. reduced prices of electric motors of 1 to 25 hp an average of 7.5 pct.

Vendor Failures — Competition in the industry has taken its toll among producers and distributors. In some cases, buyers have been left high and dry with open orders with vendors who go under. Forty-two electronics manufacturers ran into financial difficulty in the year ending March 31 compared to 39 a year previous.

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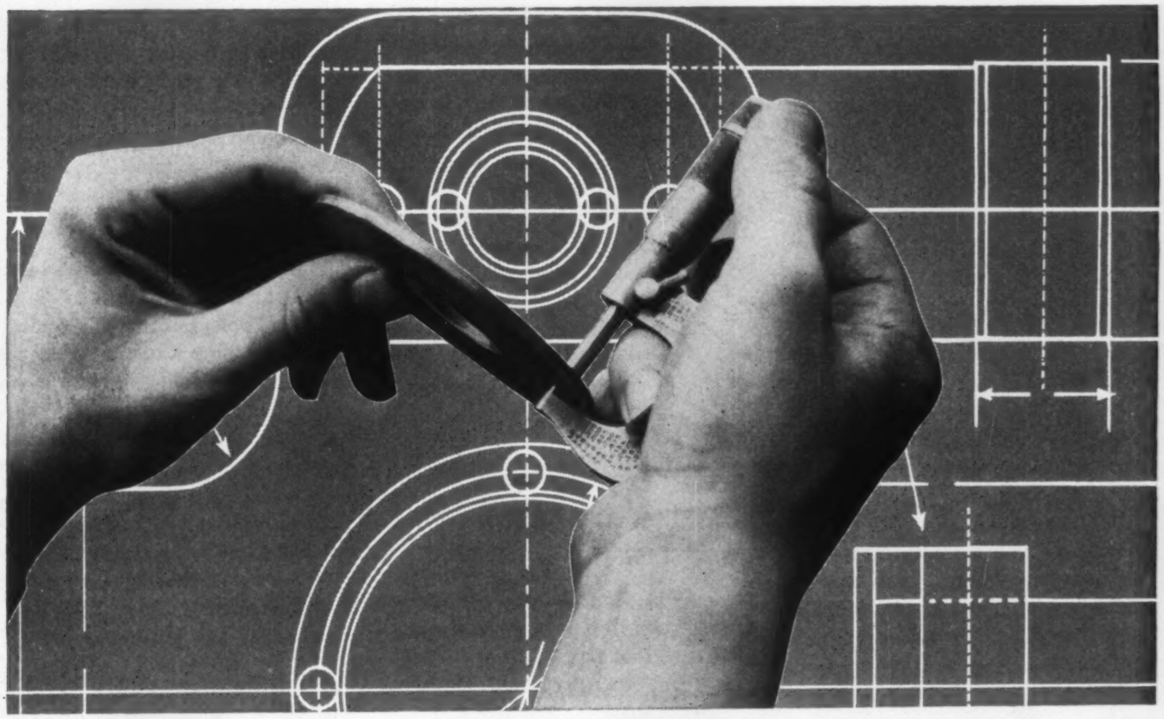

PORTER ***DISSTON DIVISION***
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Inventory Building Still Mostly Talk

Looking ahead to possible steel shortages next summer, some buyers are doing more thinking about inventories.

But it's still too early for any plans to show up in actual orders.

▪ "Steel users are doing a lot of talking about building inventories," says a mill sales manager. "But, so far, that's all it is—talk."

This just about sums up the current customer attitude on stockpiling steel. There's hardly any doubt buyers are starting to look ahead to next summer when steel contracts run out. Some are doing a lot of thinking about buying plans for the first half. But it's too early for these plans to show up in orders.

Playing It Safe—However, present trends show how the buyers are thinking ahead.

Some continue giving a part of their business to distant mills, even when this involves a freight premium. In this way, they keep an order pattern set up with out-of-the-area mills, against the prospect of a tight market.

For example, plates and shapes are coming into the Cleveland area at a premium freight, even though readily available for less from Pittsburgh, Buffalo, or Chicago area mills.

Against the Grain—Users who had to scramble for steel during the 1959 strike have not yet forgotten their difficulties. Some, seeking foreign steel, had to sign long-term contracts which turned out to be costly.

Right now U. S. mills are urging buyers to begin some inventory building—even in a small way. But with steel capacity ample and deliveries reasonably fast, most buyers are reluctant to do this.

Sheet and Strip—Mills wonder if tonnage lost by auto shutdowns in September and October will be subtracted from fourth quarter output. In any event, the auto confusion has not lead to any big upsurge in October shipments. Many mills say October shipments will equal or only slightly top September.

Right now, November orders are coming in at a fair pace. December also looks promising, although the tonnage actually booked is still small.

Orders from automakers slackened during the first week in October, but not a great deal. Tonnage booked was a little less than normal.

Appliance makers are coming into the market as expected seasonally. They are taking good tonnages of sheet. Other users are buying more flat-rolled, but mainly to meet production schedules, not for inventory building.

Galvanized sheet deliveries remain extended, out to 10 weeks in some cases.

Reinforcing Bar—Business is still hotly competitive between mills, independent fabricators, and importers. The going price for re-bars at **Cleveland** is now about $5.15 a hundredweight, compared with the previous published price of $5.675. This is a reduction of about $10.50 a ton from the old price. Imports are going at another $5 to $10 below the present domestic price.

However, domestic mills are still getting a good share of business, because of fast delivery. If imported steel can be located, it can be delivered at a price lower than domestic re-bar. But if it must be ordered from the mill or distant stocking point, it's difficult for foreign suppliers to compete.

Stainless—Demand is moving up slowly, but steadily, according to a **Pittsburgh** producer. But another supplier on the **East Coast** says sales are 25 pct or more below quotas. Price competition continues unabated. Japanese stainless is a competitive threat in **East Coast** markets.

Pipe and Tubing—Demand remains static in this product area. For one **Pittsburgh** mill, September shipping volume was only up 2 pct from August. A slight pickup in oil drilling activity is encouraging mills about the outlook for oil country seamless. Demand for standard pipe and conduit is a little more active.

Linepipe is still lagging. At northern Ohio mills, business is slow except for small sized pipe going into apartment building and light commercial construction.

Pig Iron—Sales picked up after the summer falloff and continue to go up moderately. Most foundries have had a mild increase in business and are ordering for immediate use. They are not yet interested in building up stocks.

PURCHASING AGENT'S CHECKLIST

Defense Dept. sets up single manager system for buying hardware, similar to that now used for metals, paints and other products.	P. 129
Special report on forming—fourth in series on metalworking's technological explosion.	P. 153
Abrasive machining cuts costs in five different areas.	P. 165

COMPARISON OF PRICES

(Effective Oct. 9, 1961)

Steel prices on this page are the average of various f.o.b. quotations of major producing areas: Pittsburgh, Chicago, Gary, Cleveland, Youngstown.

Price changes from previous week are shown by an asterisk (*).

	Oct. 9 1961	Oct. 2 1961	Sept. 11 1961	Oct. 11 1960
Flat-Rolled Steel: (per pound)				
Hot-rolled sheets	5.10¢	5.10¢	5.10¢	5.10¢
Cold-rolled sheets	6.275	6.275	6.275	6.275
Galvanized sheets (10 ga.)	6.875	6.875	6.875	6.875
Hot-rolled strip	5.10	5.10	5.10	5.10
Cold-rolled strip	7.425	7.425	7.425	7.425
Plate	5.30	5.30	5.30	5.30
Plates, wrought iron	14.10	14.10	14.10	14.10
Stainl's C-R strip (No. 302)	49.50	49.50	52.00	52.00
Tin and Terneplate: (per base box)				
Tin plates (1.50 lb.) cokes	$10.65	$10.65	$10.65	$10.65
Tin plates, electro (0.50 lb.)	9.35	9.35	9.35	9.35
Special coated mfg. ternes	9.90	9.90	9.90	9.90
Bars and Shapes: (per pound)				
Merchant bar	5.675¢	5.675¢	5.675¢	5.675¢
Cold finished bar	7.65	7.65	7.65	7.65
Alloy bar	6.725	6.725	6.725	6.725
Structural shapes	5.50	5.50	5.50	5.50
Stainless bars (No. 302)	46.75	46.75	46.75	46.75
Wrought iron bars	14.90	14.90	14.90	14.90
Wire: (per pound)				
Bright wire	8.00¢	8.00¢	8.00¢	8.00¢
Rails: (per 10 lb.)				
Heavy rails	$5.75	$5.75	$5.75	$5.75
Light rails	6.725	6.725	6.725	6.725
Semifinished Steel: (per net ton)				
Rerolling billets	$80.00	$80.00	$80.00	$80.00
Slabs, rerolling	80.00	80.00	80.00	80.00
Forging billets	99.50	99.50	99.50	99.50
Alloys, blooms, billets, slabs	119.00	119.00	119.00	119.00
Wire Rods and Skelp: (per pound)				
Wire rods	6.49¢	6.40¢	6.40¢	6.40¢
Skelp	5.05	5.05	5.05	5.05
Finished Steel Composite: (per pound)				
Base price	6.196¢	6.196¢	6.196¢	6.196¢

	Oct. 9 1961	Oct. 2 1961	Sept. 11 1961	Oct. 11 1960
Pig Iron: (per gross ton)				
Foundry, del'd Phila.	$70.68	$70.68	$70.68	$70.57
Foundry, South Cin'ti.	71.92	71.92	71.92	73.87
Foundry, Birmingham	62.50	62.50	62.50	62.50
Foundry, Chicago	66.50	66.50	66.50	66.50
Basic, del'd Philadelphia	70.11	70.11	70.11	70.07
Basic Valley furnace	66.00	66.00	66.00	66.00
Malleable, Chicago	66.50	66.50	66.50	66.50
Malleable, Valley	66.50	66.50	66.50	66.50
Ferromanganese 74-76 pct Mn. Cents per lb‡	11.00	11.00	11.00	11.00
Pig Iron Composite: (per gross ton)				
Pig iron	$66.44	$66.44	$66.44	$66.41
Scrap: (per gross ton)				
No. 1 steel, Pittsburgh	$37.50	$37.50	$37.50	$29.50
No. 1 steel, Phila. area	40.50	40.50	40.50	33.50
No. 1 steel, Chicago	39.50	39.50	40.50	26.50
No. 1 bundles, Detroit	33.50*	34.50	35.50	25.50
Low phos., Youngstown	41.00*	42.00	43.50	32.00
No. 1 mach'y cast., Pittsburgh	45.00	45.50	45.50	45.50
No. 1 mach'y cast., Phila.	49.50	49.50	49.50	49.50
No. 1 mach'y cast., Chicago	49.50	49.50	50.50	41.50
Steel Scrap Composite: (per gross ton)				
No. 1 hvy. melting scrap	$39.17	$39.17	$39.50	$29.83
No. 2 bundles	26.17	26.17	26.17	20.71
Coke, Connellsville: (per net ton at oven)				
Furnace coke, prompt	$14.75-15.50	14.75-15.50	14.75-15.50	14.75-15.50
Foundry coke, prompt	18.50	18.50	18.50	18.50
Nonferrous Metals: (cents per pound to large buyers)				
Copper, electrolytic, Conn.	$31.00	$31.00	$31.00	$33.00
Copper, Lake, Conn.	31.00	31.00	31.00	33.00
Tin, Straits, N. Y.	120.25†	121.50**	121.50	103.75
Zinc, East St. Louis	11.50	11.50	11.50	13.00
Lead, St. Louis	11.00	11.00	11.00	11.80
Aluminum, ingot	24.00	24.00	26.00	26.00
Nickel, electrolytic	74.00	74.00	74.00	74.00
Magnesium, ingot	36.00	36.00	36.00	36.00
Antimony, Laredo, Tex.	29.50	29.50	29.50	29.50

† Tentative. ‡ Average. ** Revised.

Finished Steel Composite

Weighted index of steel bars, shapes, plates, wire, rails, black pipe, hot and cold rolled sheets and strips.

Pig Iron Composite

Based on averages for basic iron at Valley furnaces and foundry iron at Chicago, Philadelphia, Buffalo and Birmingham.

Steel Scrap Composite

Average of No. 1 heavy melting steel scrap and No. 2 bundles delivered to consumers at Pittsburgh, Philadelphia and Chicago.

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* Appears in the Oct. 5-Oct. 19 issues.

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Rail Lists, Export Weaken Market

Rail lists brought lower prices and export continues to be unsteady.

Weakness has spread from coast to coast, with price cuts hitting many grades.

▪ Further signs of weakness crept into the scrap market this week. Railroad lists in the East came in at $1 lower in most grades, touching off the same drop that followed the automotive lists in Detroit and Cleveland last week.

With the Japanese spreading their buying over a longer period, export has been hard hit on both coasts.

In the West, prices dropped across the board: Mill demand has dropped considerably there, and Japanese buyers have put off October shipments for at least a month.

In the East, prospects of a bigger share of the 65 to 71 cargoes bound for Japan in the fourth quarter haven't materialized as yet. There is still congestion in the Japanese home ports and the buyers seem sure to be spreading orders into the first of next year.

Despite the general market weakness, the No. 1 heavy melting composite price remains at $39.17; the No. 2 bundles composite at $26.17.

Pittsburgh — Prices of industrial and railroad grades are off $1 to $2 here, on the basis of recent lists. Dealer openhearth grades share in the general weakness. But there is not enough activity to figure new price levels for these. The break in the industrial market came when a special offering of factory bundles sold for less than $43 to the broker. This was about $2.50 under the average price paid last month. On a major railroad list, prices of most grades were down $1 or less.

Chicago—There was weakness in some grades. But slipping prices in several grades were offset by minor advances at other points. Mill restrictions on shipments have slowed activity, and a mild softness is reported in dealer prices. This has not produced any major price change at the consumer level.

Philadelphia—The market is not as firm as it has been. Any new buying might bring lower prices. Rail lists last week were off $1 a ton from the last ordering. No. 1 grade bundles and busheling dropped $1. Export is definitely easier, and the general market is reflecting it.

New York—Prices are unchanged. Last month's promise of increased domestic business has faded, at least for the present. There is some easiness in this market. But dealers say it is probably a reflection of softer inland markets.

Detroit—The market dip put a clamp on trading. Prices of No. 1 grades are lower than last week. Fisher Body bundles brought $2 to $2.50 per ton less in the first week of October than at the end of August. The company is picking up September deliveries faster than expected. Activity at Fisher is gaining and tonnage will climb quite a bit in coming weeks. Fisher offered 48,000 tons of bundles around the country, some 14,000 in Michigan plants. Although the local market is quiet, guesses are it is not far from the bottom for the rest of the year. A boost would come from auto labor peace, increased auto production, and solid steel orders.

Cleveland—Rebids on strike-lost tonnage were off to about $39 maximum on cars, or about $3 below a month ago. Big mills are still not entering the market on a large scale. One Valley mill, which did, had to hold up shipments. Foundry market also slowed down more a result of auto strikes than business decline.

Cincinnati—Market has a weak tone as buyers stay out. But dealers will sell only small amounts at prevailing prices. Pattern for a month will be mainly local shipments to one consumer. Upriver demand is too weak to absorb any tonnage at present price spread.

St. Louis—Slower demand and larger stocks pushed down key prices $1 here. There is now more scrap than mills can absorb. Some dealers look for still lower prices in the immediate future. Cast grades are very weak.

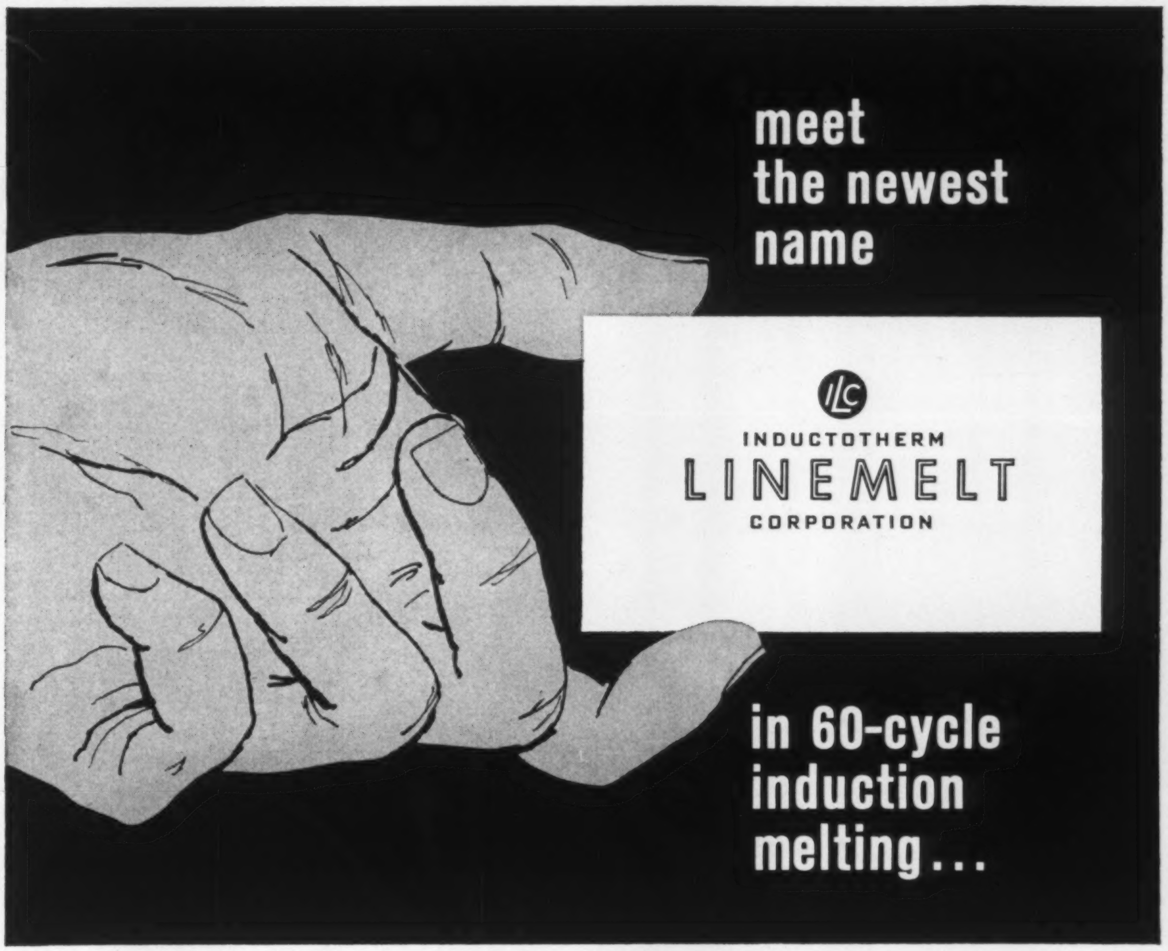
Birmingham—Contrary to usual first-of the month activity, the market here continues quiet. The few orders placed were at the market level. But most brokers were cutting quotations at the weekend. The cast market appears weakest. Export buying is also off from the last quarter.

Buffalo—Prices remain unchanged. There's a softer tone to the market now, due to weakness and outside markets.

Boston—The market is still quiet. Prices of No. 1 grade bundles and busheling dropped $1. There has been a slight rise in export activity.

Houston—Prices continue to be stable. But there are definite undertones of weakness. Brokers look for lower prices on future orders.

West Coast—As expected, prices have dropped. And they're still not too firm at the lower levels. There is a lack of mill demand, with domestic mills buying only small tonnages. And Japanese buyers have put off their October shipments at least one month.



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SCRAP PRICES *(Effective Oct. 9, 1961)*

Pittsburgh

No. 1 hvy. melting	$37.00	to	$38.00
No. 2 hvy. melting	29.00	to	30.00
No. 1 dealer bundles	38.00	to	39.00
No. 1 factory bundles	45.00	to	46.00
No. 2 bundles	26.00	to	27.00
No. 1 busheling	37.00	to	38.00
Machine shop turn.	15.00	to	16.00
Shoveling turnings	20.00	to	21.00
Cast iron borings	19.00	to	20.00
Low phos. punch'gs plate	45.00	to	46.00
Heavy turnings	32.00	to	33.00
No. 1 RR hvy. melting	42.00	to	43.00
Scrap rails, random lgth.	46.00	to	47.00
Rails 2 ft and under	51.00	to	52.00
RR specialties	47.00	to	48.00
No. 1 machinery cast.	45.00	to	46.00
Cupola cast.	37.00	to	38.00
Heavy breakable cast.	33.00	to	34.00
Stainless			
18-8 bundles and solids	190.00	to	195.00
18-8 turnings	115.00	to	120.00
430 bundles and solids	85.00	to	90.00
410 turnings	55.00	to	60.00

Chicago

No. 1 hvy. melting	$39.00	to	$40.00
No. 2 hvy. melting	35.00	to	36.00
No. 1 dealer bundles	40.00	to	41.00
No. 1 factory bundles	43.50	to	44.50
No. 2 bundles	25.00	to	26.00
No. 1 busheling	39.00	to	40.00
Machine Shop turn.	19.00	to	20.00
Mixed bor. and turn.	20.00	to	21.00
Shoveling turnings	21.00	to	22.00
Cast iron borings	21.00	to	22.00
Low phos. forge crops	48.00	to	49.00
Low phos. punch'gs plate, ¼ in. and heavier	46.00	to	47.00
Low phos. 2 ft and under	44.00	to	45.00
No. 1 RR hvy. melting	43.00	to	44.00
Scrap rails, random lgth.	49.00	to	50.00
Rerolling rails	60.00	to	62.00
Rails 2 ft and under	52.00	to	53.00
Angles and splice bars	47.00	to	48.00
RR steel car axles	60.00	to	61.00
RR couplers and knuckles	47.00	to	48.00
No. 1 machinery cast.	49.00	to	50.00
Cupola cast.	42.00	to	43.00
Cast iron wheels	37.00	to	38.00
Malleable	46.00	to	47.00
Stove plate	36.00	to	37.00
Steel car wheels	45.00	to	46.00
Stainless			
18-8 bundles and solids	185.00	to	190.00
18-8 turnings	110.00	to	115.00
430 bundles and solids	95.00	to	100.00
430 turnings	55.00	to	60.00

Philadelphia Area

No. 1 hvy. melting	$40.00	to	$41.00
No. 2 hvy. melting	36.00	to	37.00
No. 1 dealer bundles	42.00	to	43.00
No. 2 bundles	26.00	to	27.00
No. 1 busheling	42.00	to	43.00
Machine shop turn.	13.00	to	14.00
Mixed bor. short turn.	16.00	to	17.00
Cast iron borings	14.00	to	15.00
Shoveling turnings	19.00	to	20.00
Clean cast. chem. borings	29.00	to	30.00
Low phos. 5 ft and under	43.00	to	45.00
Low phos. 2 ft punch'gs	45.00	to	46.00
Elec. furnace bundles	44.00	to	45.00
Heavy turnings	27.00	to	28.00
RR specialties	45.00	to	46.00
Rails, 18 in. and under	54.00	to	55.00
Cupola cast.	39.00	to	40.00
Heavy breakable cast.	41.00	to	42.00
Cast iron car wheels	43.00	to	44.00
Malleable	48.00	to	49.00
No. 1 machinery cast.	49.00	to	50.00

Cincinnati

Brokers buying prices per gross ton on cars:

No. 1 hvy. melting	$35.00	to	$36.00
No. 2 hvy. melting	28.00	to	29.00
No. 1 dealer bundles	36.00	to	37.00
No. 2 bundles	21.00	to	22.00
Machine shop turn.	9.00	to	10.00
Shoveling turnings	14.00	to	15.00
Cast iron borings	14.00	to	15.00
Low phos. 18 in. and under	42.00	to	43.00
Rails, random length	42.00	to	43.00
Rails, 18 in. and under	47.00	to	48.00
No. 1 cupola cast.	33.00	to	34.00
Heavy breakable cast.	30.00	to	31.00
Drop broken cast.	45.00	to	46.00

Youngstown

No. 1 hvy. melting	$38.50	to	$39.50
No. 2 hvy. melting	28.50	to	29.50
No. 1 dealer bundles	38.50	to	39.50
No. 2 bundles	24.00	to	25.00
Machine shop turn.	17.00	to	18.00
Shoveling turnings	19.00	to	20.00
Low phos. plate	40.50	to	41.50

Iron and Steel Scrap

Going prices of iron and steel scrap as obtained in the trade by THE IRON AGE based on representative tonnages. All prices are per gross ton delivered to consumer unless otherwise noted.

Cleveland

No. 1 hvy. melting	$36.00	to	$37.00
No. 2 hvy. melting	25.00	to	26.00
No. 1 dealer bundles	36.00	to	37.00
No. 1 factory bundles	40.00	to	41.00
No. 2 bundles	22.50	to	23.50
No. 1 busheling	36.00	to	37.00
Machine shop turn.	15.00	to	16.00
Mixed bor. and turn.	18.00	to	19.00
Shoveling turnings	18.00	to	19.00
Cast iron borings	18.00	to	19.00
Cut structural & plates, 2 ft & under	40.00	to	41.00
Low phos. punch'gs plate	37.00	to	38.00
Drop forge flashings	36.00	to	37.00
Foundry steel, 2 ft & under	35.50	to	36.50
No. 1 RR hvy. melting	39.00	to	40.00
Rails 2 ft and under	47.00	to	48.00
Rails 18 in. and under	50.00	to	51.00
Steel axle turnings	26.00	to	27.00
Railroad cast.	44.00	to	45.00
No. 1 machinery cast.	44.00	to	45.00
Stove plate	38.00	to	39.00
Malleable	49.00	to	50.00
Stainless			
18-8 bundles	180.00	to	185.00
18-8 turnings	105.00	to	110.00
430 bundles	85.00	to	90.00

Buffalo

No. 1 hvy. melting	$33.00	to	$34.00
No. 2 hvy. melting	26.00	to	27.00
No. 1 busheling	33.00	to	34.00
No. 1 dealer bundles	33.00	to	34.00
No. 2 bundles	24.00	to	25.00
Machine shop turn.	13.00	to	14.00
Mixed bor. and turn.	14.00	to	15.00
Cast iron borings	15.00	to	16.00
Low phos. plate	39.00	to	40.00
Structural and plate, 2 ft and under	41.00	to	42.00
Rails 2 ft and under	50.00	to	51.00
Scrap rails, random lgth.	40.00	to	41.00
No. 1 machinery cast.	43.00	to	44.00
No. 1 cupola cast.	37.00	to	38.00

St. Louis

No. 1 hvy. melting	$35.00	to	$36.00
No. 2 hvy. melting	30.00	to	31.00
Foundry steel, 2 ft.	32.00	to	33.00
No. 1 dealer bundles	36.00	to	37.00
No. 2 bundles	25.00	to	26.00
Machine shop turn.	16.50	to	17.50
Shoveling turnings	18.50	to	19.50
Cast iron borings	26.00	to	27.00
No. 1 RR hvy. melting	39.00	to	40.00
Rails random lengths	42.00	to	43.00
Rails, 18 in. and under	46.00	to	47.00
RR specialties	43.00	to	44.00
Cupola cast.	36.00	to	37.00
Heavy breakable cast.	32.00	to	33.00
Stove plate	31.00	to	32.00
Cast iron car wheels	34.00	to	35.00
Rerolling rails	56.00	to	57.00
Unstripped motor blocks	34.00	to	35.00

Birmingham

No. 1 hvy. melting	$37.00	to	$38.00
No. 2 hvy. melting	29.00	to	30.00
No. 1 dealer bundles	37.00	to	38.00
No. 2 bundles	21.00	to	22.00
No. 1 busheling	40.00	to	41.00
Machine shop turn.	18.00	to	19.00
Shoveling turnings	20.00	to	21.00
Cast iron borings	10.00	to	11.00
Electric furnace bundles	40.00	to	41.00
Elec. furnace, 3 ft & under	38.00	to	39.00
Bar crops and plate	44.00	to	45.00
Structural and plate, 2 ft.	43.00	to	44.00
No. 1 RR hvy. melting	38.00	to	39.00
Scrap rail, random lgth.	42.00	to	43.00
Rails, 18 in. and under	46.00	to	47.00
Angles and splice bars	44.00	to	45.00
No. 1 cupola cast.	41.00	to	42.00
Stove plate	41.00	to	42.00
Cast iron car wheels	34.00	to	35.00
Unstripped motor blocks	30.00	to	31.00

New York

Brokers buying prices per gross ton on cars:

No. 1 hvy. melting	$31.00	to	$32.00
No. 2 hvy. melting	25.00	to	26.00
No. 2 dealer bundles	19.00	to	20.00
Mixed bor. and turn.	5.00	to	6.00
Machine shop turnings	5.00	to	6.00
Shoveling turnings	7.00	to	8.00
Clean cast. chem. borings	19.00	to	20.00
No. 1 machinery cast.	38.00	to	39.00
Mixed yard cast.	34.00	to	35.00
Heavy breakable cast.	32.00	to	33.00
Stainless			
18-8 prepared solids	160.00	to	165.00
18-8 turnings	80.00	to	85.00
430 prepared solids	65.00	to	70.00
430 turnings	20.00	to	25.00

Detroit

Brokers buying prices per gross ton on cars:

No. 1 hvy. melting	$33.00	to	$34.00
No. 2 hvy. melting	28.00	to	29.00
No. 1 dealer bundles	33.00	to	34.00
No. 2 bundles	22.00	to	23.00
No. 1 busheling	32.00	to	33.00
Drop forge flashings	32.00	to	33.00
Machine shop turn.	12.00	to	13.00
Mixed bor. and turn.	15.00	to	16.00
Shoveling turnings	16.00	to	17.00
Cast iron borings	15.00	to	16.00
Heavy breakable cast.	28.00	to	29.00
Mixed cupola cast.	31.00	to	32.00
Automotive cast.	42.00	to	43.00
Stainless			
18-8 bundles and solids	175.00	to	180.00
18-8 turnings	80.00	to	85.00
430 bundles and solids	70.00	to	75.00

Boston

Brokers buying prices per gross ton on cars:

No. 1 hvy. melting	$28.00	to	$29.00
No. 2 hvy. melting	25.00	to	26.00
No. 1 dealer bundles	30.50	to	31.50
No. 2 bundles	19.00	to	20.00
No. 1 busheling	30.50	to	31.50
Machine shop turn.	4.00	to	5.00
Shoveling turnings	9.50	to	10.00
Clean cast. chem. borings	17.50	to	18.50
No. 1 machinery cast.	38.00	to	39.00
Mixed cupola cast.	30.00	to	31.00
Heavy breakable cast.	30.00	to	30.50

San Francisco

No. 1 hvy. melting	$43.00	to	$45.00
No. 2 hvy. melting	....		40.00
No. 1 dealer bundles	....		33.00
No. 2 bundles	25.00	to	26.00
Machine shop turn.	....		17.00
Cast iron borings	....		17.00
No. 1 cupola cast.	....		50.00

Los Angeles

No. 1 hvy. melting	$42.00	to	$44.00
No. 2 hvy. melting	37.00	to	38.00
No. 1 dealer bundles	....		33.00
No. 2 bundles	25.00	to	26.00
Machine shop turn.	....		16.00
Shoveling turnings	....		16.00
Cast iron borings	....		16.00
Elec. furnace 1 ft and under (foundry)	50.00	to	52.00
No. 1 cupola cast.	47.00	to	48.00

Seattle

No. 1 hvy. melting	....		$45.00
No. 2 hvy. melting	....		40.00
No. 2 bundles	....		26.00
No. 1 cupola cast.	....		36.00
Mixed yard cast.	....		31.00

Hamilton, Ont.

Brokers buying prices per net ton on cars:

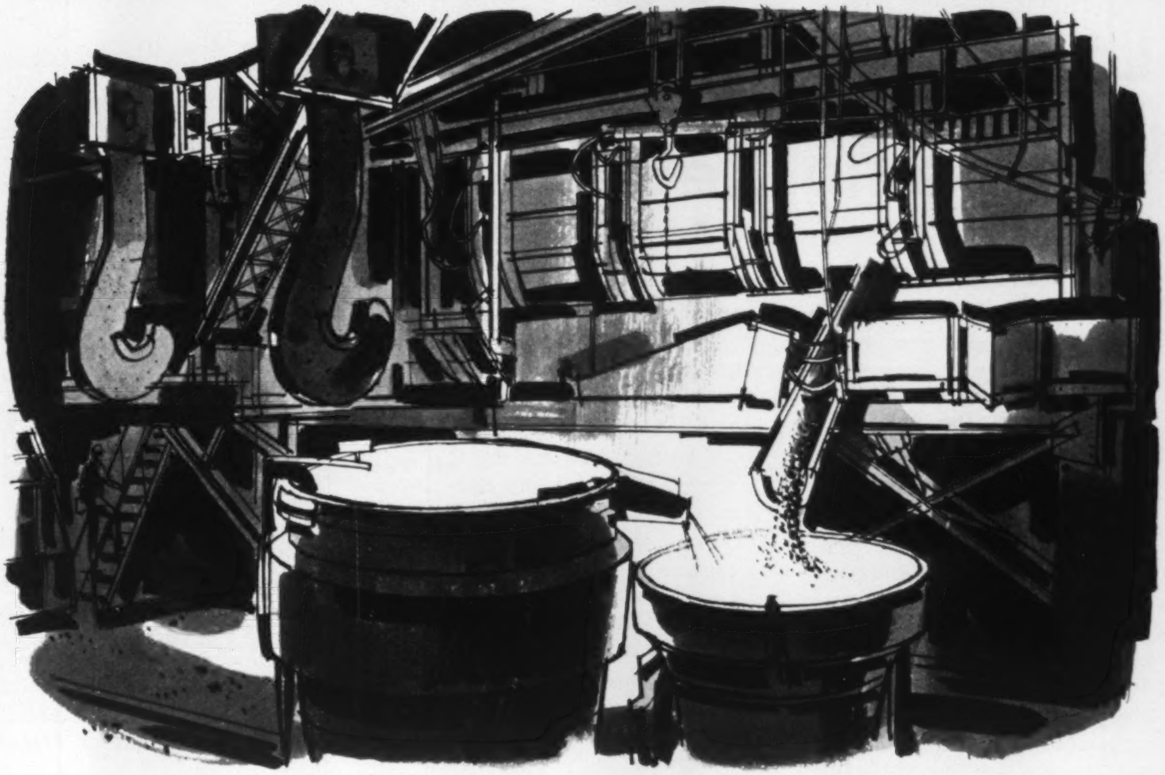
No. 1 hvy. melting	....		$30.00
No. 2 hvy. melting cut 3 ft and under	....		27.00
No. 1 dealer bundles	....		31.00
No. 2 bundles	....		23.50
Mixed steel scrap	....		22.00
Bush., New fact., prep'd.	....		30.00
Bush., new fact., unprep'd	....		24.00
Machine shop turn.	....		8.00
Short steel turn.	....		12.00
Mixed bor. and turn.	....		12.00
Cast scrap	....		32.00

Houston

Brokers buying prices per gross ton on cars:

No. 1 hvy. melting	....		$37.00
No. 2 hvy. melting	....		34.00
No. 2 bundles	....		24.00
Machine shop turn.	....		12.00
Shoveling turnings	....		15.00
Cut structural plate 2 ft & under	$44.00	to	45.00
Unstripped motor blocks	28.00	to	29.00
Cupola cast.	36.00	to	37.00
Heavy breakable cast.	28.00	to	29.00

DANGEROUS INTRUDERS IN IRON AND STEEL



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Arsenic is useful for the resistance to corrosion and erosion which its presence imparts to copper and arsenic bronze. Alloyed with lead, it facilitates the forming of perfect spheres in producing shot.

Its presence in a steel composition, however, is another matter. Arsenic is likely to make its first appearance in the raw materials entering the blast furnace. Present in any quantity either in the iron ores or the coke, it will appear in the pig iron and eventually find its way into the finished steel. A certain amount may also be present in contaminated scrap.

In quantities of more than one percent, arsenic may reduce the ductility and impact strength of steel and eventually cause surface cracking. Even small amounts may induce loss of toughness in chromium-nickel steels in the heat treated condition. Compared with some of the other residual elements, arsenic has not been one of the major enemies present in steel but it is an element that bears consideration and continued study.

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Lead-Zinc Miners Get Some Relief

Small lead-zinc miners got partial relief with the new subsidy bill last week.

But it had little effect on either market. The industry is sure supply and prices will stay stable the rest of the year.

- Small domestic lead-zinc miners finally got some long-sought relief from the government last week.

President Kennedy signed the bill. Under it, a producer selling less than 3000 tons of lead and zinc combined, in any year since 1956, can get a subsidy of 75 pct of the difference between 14.5¢ per lb and the current market price of lead. Or he can get 55 pct of the difference between 14.5¢ per lb and the current price of zinc.

Current prices: Lead, 11¢ per lb; zinc, 11.5¢ per lb.

Payments are restricted to 1500 tons of each metal the first year; 1200 tons the second; 900 tons the third; and 600 tons the final year.

New Funds—Another bill is still needed to provide the $16 million to run the program.

The subsidy move was little noticed in either the lead or zinc markets. The industry generally classed it as "relief" rather than "incentive." Consensus is it will have little, if any, effect on the market.

Both lead and zinc continued to show some signs of strength, but only slightly. The industry is reasonably sure both supply and price will remain much as it is now through the rest of the year.

Slight Gains—With most of the last quarter left, it's going to be nip and tuck as to whether the domestic industry will do any better than last year. Based more on the slight upward trend than current orders, some top lead and zinc sellers guess that the metals are likely to do about 5 pct better than 1960.

One leading lead and zinc producer points out that this well may indicate much better days ahead, particularly in zinc.

Foreign Cuts — Discounting by sellers of foreign lead and zinc continues to be a problem. But it appears to be easing and now is hurting domestic sellers along the East Coast most.

Tariff Report—Early last week, the Tariff Commission published its second report on developments in unmanufactured lead and zinc. The object: Recommend what, if anything, should be done to alter current quotas.

In 43 pages, mostly tables, the Commission recommended no changes.

The volume of metal moving now is relatively small, as is the discount. So the industry figures quotas simply aren't a factor, one way or the other.

Lead Aims—Zinc and lead sellers (most sell both) would much rather talk about zinc than lead at present.

Lead has a number of bright new markets on the horizon, including sound attenuation and nuclear shielding. But storage batteries and tetraethyl gasoline just about covers the current market.

Zinc Stir—In zinc, more exciting things are happening. Galvanized sheet for automotives shows great potential.

American Zinc Institute points out Ford Motor Co. was the first to use large tonnages of galvanized —in 1959 on the Falcon. In 1960, Ford used 58,000 tons. The estimate for this year is 80,000 tons.

General Motors is broadening its use of galvanized steel for rocker panels, quarter sections, mufflers.

And for the first time, Chrysler Corp. will use galvanized sheets on 1962 models.

AZI figures auto consumption of zinc will climb at least 10 pct in the 1962 models. This, the industry feels, is a very sound base for building better business in 1962.

Tin Prices for the Week

October 3—121.50; October 4—121.00; October 5—120.75; October 6 — 120.50; October 9 — 120.25.*

*Estimate.

Monthly Average Metal Prices

(Cents per lb except as noted)

Average prices of the major nonferrous metals in SEPTEMBER based on quotations appearing in THE IRON AGE, were as follows:

Electrolytic copper, del'd	
Conn. Valley	31.00
Copper, Lake	31.00
Straits, Tin, New York	121.85
Zinc, E. St. Louis	11.50
Lead, St. Louis	10.80
Aluminum Ingot	25.50

Note: Quotations are on going prices.

Primary Prices

(cents per lb.)	current price	last price	date of change
Aluminum Ingot	24.00	26.00	9/25/61
Copper (E)	31.00	30.00	5/16/61
Copper (CS)	31.00	30.00	5/17/61
Copper (L)	31.00	30.00	5/17/61
Lead, St. L.	10.80	11.80	12/13/60
Lead, N. Y.	11.00	12.00	12/13/60
Magnesium Ingot	36.00	34.50	8/13/56
Magnesium pig	35.25	33.75	8/13/56
Nickel	81.25	74.00	6/30/61
Titanium sponge	150–160	162–182	8/1/59
Zinc, E. St. L.	11.50	12.50	1/12/61
Zinc, N. Y.	12.00	13.00	1/12/61

ALUMINUM: 99% Ingot. **COPPER:** (E) = electrolytic, (CS) = custom smelters, electrolytic. (L) = lake. **LEAD:** common grade. **MAGNESIUM:** 99.8% pig Velasco, Tex. **NICKEL:** Port Colborne, Canada. **ZINC:** prime western. Other primary prices, pg. 261.

MILL PRODUCTS

(Cents per lb unless otherwise noted)

ALUMINUM

(Base 30,000 lb, f.o.b. customer's plant)

Flat Sheet (Mill Finish and Plate)

("F" temper except 6061-0)

Alloy	.030-.037	.047-.060	.076-.096	.154-.250
1100, 3003	47.4	46.4	45.4	44.4
5062	54.8	52.0	49.8	46.8
6061-0	53.0	50.3	48.4	47.9

Extruded Solid Shapes

Factor	6063 T-5	6062 T-6
1-17	45.3-46.8	54.0-61.8
18-32	45.8-47.5	58.6-81.5
33-38	49.5-52.2	85.1-96.6
39-44	59.8-63.6	102.0-124.0

Screw Machine Stock—2011-T-3

Size"	7/32-5/16	11/32-23/32	¾-1 1/16	1 3/32-1½
Price	60.0	59.2	57.7	55.3

Roofing Sheet, Corrugated

(Per sheet, 26" wide base, 16,000 lb)

Length"→	72	96	120	144
.019 gage	$1.506	$2.013	$2.515	$3.017

MAGNESIUM

(F.o.b. shipping pt., carload frt. allowed)

Sheet and Plate

Type↓ Gage→	.250 3.00	.250-2.00	.188	.081	.032
AZ31B Stand, Grade	......	67.9	69.0	77.9	103.1
AZ31B Spec.	......	93.3	96.9	108.7	171.3
Tread Plate	......	70.6	71.7	......	......
Tooling Plate	73.0	......	......	......	......

Extruded Shapes

factor→	6-8	12-14	24-26	36-38
Comm. Grade. (AZ31C)	65.3	65.3	66.1	71.5
Spec. Grade... (AZ31B)	84.6	85.7	90.6	104.2

Alloy Ingot

AZ91B (Die Casting)	37.25 (delivered)
AZ63A, AZ92A, AZ91C (Sand Casting)	40.75 (Velasco, Tex.)

NICKEL, MONEL, INCONEL

(Base prices f.o.b. mill)

	"A" Nickel	Monel	Inconel
Sheet, CR	147	126	145
Strip, CR	133	114	145
Rod, bar, HR	116	95	116
Angles, HR	116	95	116
Plates, HR	139	116	133
Shot, blocks	...	93	...

COPPER, BRASS, BRONZE

(Freight included in 5000 lbs)

	Sheet	Wire	Rod	Tube
Copper	56.13	....	53.61	57.32
Brass, Yellow	49.27	49.56	49.21	53.43
Brass, Low	52.15	52.44	52.09	56.21
Brass, Rod	53.17	53.46	53.11	57.23
Brass, Naval	53.94	60.25	47.75	58.10
Muntz Metal	51.94	....	47.25	....
Comm. Bz.	54.73	55.02	54.67	58.34
Mang. Bz.	57.71	61.54	51.27	....
Phos. Bz. 5%	76.97	76.72	77.47	78.90

Free Cutting Brass Rod 34.77

TITANIUM

(Base 30,000 lb. f.o.b. customer's plant)

Sheet and strip, commercially pure, $6.75-$13.00; alloy, $13.40-$17. Plate HR, commercially pure, $5.25-$9.00; alloy, $8.00-$10.00. Wire, rolled and/or drawn, commercially pure, $5.55-$6.05; alloy, $5.55-$9.00; bar, HR or forged commercially pure, $4.00-$4.50; alloy, $4.00-$6.25; billets, HR, commercially pure, $3.20-$3.70; alloy, $3.20-$4.75.

PRIMARY METAL

(Cents per lb unless otherwise noted)

Antimony, American, Laredo, Tex.	32.50
Beryllium Aluminum 5% Be, Dollars per lb contained Be	$ 5.00
Beryllium copper, per lb conta'd Be	$43.00
Beryllium 97% lump or beads, f.o.b. Cleveland, Reading	$70.00
Bismuth, ton lots	$ 2.25
Cadmium, del'd	$ 1.70
Calcium, 99.9% small lots	$ 4.55
Chromium, 99.8% metallic base	$ 1.31
Cobalt, 97-99% (per lb)	$1.50 to $ 1.57
Germanium, per gm, f.o.b. Miami, Okla., refined	$29.95 to $36.95
Gold, U. S. Treas., per troy oz.	$35.00
Indium, 99.9% dollars per troy oz.	$ 2.25
Iridium, dollars per troy oz.	$75 to $85
Lithium, 98%	$9.00 to $12.00
Magnesium sticks, 10,000 lb.	57.00
Mercury dollars per 76-lb flask f.o.b. New York	$188 to $191
Nickel oxide sinter at Buffalo, N. Y. or other U. S. points of entry, contained nickel	77.50
Palladium, dollars per troy oz.	$24 to $26
Platinum, dollars per troy oz.	$82 to $85
Rhodium	$137 to $140
Silver ingots (¢ per troy oz.)	91.375
Thorium, per pg	$43.00
Vanadium	$ 3.65
Zirconium sponge	$ 5.00

REMELTED METALS

Brass Ingot

(Cents per lb delivered, carloads)

85-5-5 ingot	
No. 115	32.00
No. 120	31.25
No. 123	30.50
80-10-10 ingot	
No. 305	36.00
No. 315	33.75
88-10-2 ingot	
No. 210	43.75
No. 215	40.50
No. 245	35.75
Yellow ingot	
No. 405	27.50
Manganese bronze	
No. 421	31.25

Aluminum Ingot

(Cents per lb del'd 30,000 lb and over)

95.5 aluminum-silicon alloys	
0.30 copper max.	23.25-23.75
0.60 copper max.	23.00-23.50
Piston alloys (No. 132 type)	25.00-26.00
No. 12 alum. (No. 2 grade)	21.25-21.75
108 alloy	21.75-22.25
195 alloy	24.25-24.75
13 alloy (0.60 copper max.)	23.00-23.50
AXS-679 (1 pct zinc)	21.50-22.50

Steel deoxidizing aluminum notch bar granulated or shot

Grade 1—95-97½%	22.75-23.75
Grade 2—92-95%	21.50-22.50
Grade 3—90-92%	20.50-21.50
Grade 4—85-90%	19.50-20.50

SCRAP METALS

Brass Mill Scrap

(Cents per pound, add 1¢ per lb for shipments of 20,000 lb and over)

	Heavy	Turnings
Copper	27	26¼
Yellow brass	20⅜	18½
Red brass	23⅞	23⅛
Comm. bronze	24¾	24
Mang. bronze	19¼	18½
Free cutting rod ends	19½	

Customs Smelters Scrap

(Cents per pound carload lots, delivered to refinery)

No. 1 copper wire	27¼
No. 1 copper wire	25¼
Light copper	23
*Refining brass	24
Copper bearing material	23

*Dry Copper content.

Ingot Makers Scrap

(Cents per pound carload lots, delivered to refinery)

No. 1 copper wire	27¼
No. 2 copper wire	25¼
Light copper	23
No. 1 composition	24½
No. 1 comp. turnings	24
Hvy. yellow brass solids	19
Heavy yellow brass turnings	18
Radiators	20½
Aluminum	
Mixed old cast.	12 —12½
Mixed new clips	14 —14½
Mixed turnings, dry	13 —13½

Dealers' Scrap

(Dealers' buying price f.o.b. New York in cents per pound)

Copper and Brass

No. 1 copper wire	23½—24
No. 2 copper wire	21½—22
Light copper	19¼—19¾
Auto radiators (unsweated)	16¼—16½
No. 1 composition	20½—21
No. 1 composition turnings	20 —20½
Cocks and faucets	16¾—17¼
Clean heavy yellow brass	14¼—14¾
Brass pipe	16½—17
New soft brass clippings	18¼—18¾
No. 1 brass rod turnings	16 —16½

Aluminum

Alum. pistons and struts	7 — 7½
Aluminum crankcase	9½—10
1100 (2s) aluminum clippings	11¾—12¼
Old sheet and utensils	9½—10
Borings and turnings	4½— 5
Industrial castings	9 — 9½
2020 (24s) clippings	10½—11

Zinc

New zinc clippings	5 — 5¼
Old zinc	3 — 3¼
Zinc routings	1¾— 2
Old die cast scrap	1¾— 2

Nickel and Monel

Pure nickel clippings	56 —58
Clean nickel turnings	43
Nickel anodes	56 —58
Nickel rod ends	56 —58
New Monel clippings	26 —26½
Clean Monel turnings	18½—19
Old sheet Monel	25 —25½
Nickel silver clippings, mixed	20
Nickel silver turnings, mixed	17

Lead

Soft scrap lead	7¼— 7½
Battery plates (dry)	3 — 3¼
Batteries, acid free	2 — 2¼

Miscellaneous

Block tin	90 —92
No. 1 pewter	65 —67
Auto babbitt	46 —47
Mixed common babbitt	10 —10½
Solder joints	15 —15½
Small foundry type	9 — 9½
Monotype	9¼— 9¾
Lino. and stereotype	8½— 8¾
Electrotype	8 — 8¼
Hand picked type shells	5¾— 6¼
Lino. and stereo. dross	1¾— 2¼
Electro dross	2½— 3

(Effective Oct. 9, 1961)

IRON AGE

STEEL PRICES

Italics identify producers listed in key at end of table. Base prices, f.o.b. mill, in cents per lb., unless otherwise noted. Extras apply.

		BILLETS, BLOOMS, SLABS			PILING	SHAPES, STRUCTURALS			STRIP					
		Carbon Rerolling Net Ton	Carbon Forging Net Ton	Alloy Net Ton	Sheet Steel	Carbon	Hi Str. Low Alloy	Carbon Wide-Flange	Hot-rolled	Cold-rolled	Hi Str. H.R. Low Alloy	Hi Str. C.R. Low Alloy	Alloy Hot-rolled	Alloy Cold-rolled
EAST	Bethlehem, Pa.			$119.00 *B3*		5.55 *B3*	8.10 *B3*	5.55 *B5*						
	Buffalo, N. Y.	$80.00 *R3, B3*	$99.50 *R3, B3*	$119.00 *R3, B3*	6.50 *B3*	5.55 *B3*	8.10 *B3*	5.55 *B3*	5.10 *B3,*	7.425 *S10, R7*	7.575 *B3*			
	Phila., Pa.									7.875 *P15*				
	Harrison, N. J.													15.55 *C11*
	Conshohocken, Pa.		$99.50 *A2*	$121.00 *A2*					5.15 *A2*		7.575 *A2*			
	New Bedford, Mass.									7.875 *R6*				
	Johnstown, Pa.	$80.00 *B3*	$99.50 *B3*	$119.00 *B3*		5.55 *B3*	8.10 *B3*							
	Boston, Mass.									7.975 *T8*				15.90 *T8*
	New Haven, Conn.									7.875 *D1*				
	Baltimore, Md.									7.425 *T8*				15.90 *T8*
	Phoenixville, Pa.					5.55 *P2*	8.10 *P2*	5.55 *P2*						
	Sparrows Pt., Md.								5.10 *B3*		7.575 *B3*			
	New Britain, Wallingford, Conn.			$119.00 *N8*						7.875 *W1,S7*				
	Pawtucket, R. I. Worcester, Mass.									7.975 *N7, A5*				15.90 *N7* 15.70 *T8*
MIDDLE WEST	Alton, Ill.								5.30 *L1*					
	Ashland, Ky.								5.10 *A7*		7.575 *A7*			
	Canton-Massillon, Dover, Ohio		$102.00 *R3*	$119.00 *R3, T5*						7.425 *G4*		10.80 *G4*		
	Chicago, Franklin Park, Evanston, Ill.	$80.00 *U1, R3*	$99.50 *U1, R3,W8*	$119.00 *U1, R3,W8*	6.50 *U1*	5.50 *U1, W8,P13*	8.05 *U1, Y1,W8*	5.50 *U1*	5.10 *W8, N4,A1*	7.425 *A1,T8, M8* 7.525* *M8*	7.575 *W8*		8.40 *W8, S9,I3*	15.55 *A1, S9,G4,T8*
	Cleveland, Ohio									7.425 *A5*		10.75 *A5*	8.40 *J3*	15.60 *N7*
	Detroit, Mich.			$119.00 *R5*					5.10 *G3, M2*	7.425 *M2, S1, D1, P11, B9*	7.575 *G3*	10.80 *S1*		
	Anderson, Ind.									7.425 *G4*				
	Gary, Ind. Harbor, Indiana	$80.00 *U1*	$99.50 *U1*	$119.00 *U1, Y1*		5.50 *U1, I3, Y1*	8.05 *U1, J3*	5.50 *I3*	5.10 *U1, I3,Y1*	7.425 *Y1*	7.575 *U1, I3,Y1*	10.90 *Y1*	8.40 *U1, Y1*	
	Sterling, Ill.	$80.00 *N4*				5.50 *N4*	7.75 *N4*	5.50 *N4*	5.20 *N4*					
	Indianapolis, Ind.									7.575 *R5*				15.70 *R5*
	Newport, Ky.								5.10 *A9*				8.40 *A9*	
	Niles, Warren, Struthers, Ohio Sharon, Pa.		$99.50 *S1, C10*	$119.00 *C10,S1*		5.50 *Y1*			5.10 *R3, S1*	7.425 *R3, T4,S1*	7.575 *R3, S1*	10.80 *R3, S1*	8.40 *S1*	15.55 *S1*
	Owensboro, Ky.	$80.00 *G5*	$99.50 *G5*	$119.00 *G5*										
	Pittsburgh, Midland, Butler, Aliquippa, N. Castle, McKeesport, Pa.	$80.00 *U1, P6*	$99.50 *U1, C11,P6*	$119.00 *U1, C11,B7*	6.50 *U1*	5.50 *U1, J3*	8.05 *U1, J3*	5.50 *U1*	5.10 *P6*	7.425 *B4, M10*			8.40 *S9*	15.55 *S9* 15.60 *N7*
	Weirton, Wheeling, Follansbee, W. Va.				6.50 *U1, W3*	5.50 *W3*		5.50 *W3*	5.10 *W3*	7.425 *W5*	7.575 *W3*	10.80 *W3*		
	Youngstown, Ohio	$80.00 *R3*	$99.50 *Y1, C10*	$119.00 *Y1*			8.05 *Y1*		5.10 *U*	7.425 *Y1,R5*	7.575 *U1, Y1*	10.95 *Y1*	8.40 *U1, Y1*	15.55 *R5, Y1*
WEST	Fontana, Cal.	$90.50 *K1*	$109.00 *K1*	$140.00 *K1*		6.30 *K1*	8.85 *K1*	6.45 *K1*	5.825 *K1*	9.20 *K1*				
	Geneva, Utah		$99.50 *C7*			5.50 *C7*	8.05 *C7*							
	Kansas City, Mo.					5.60 *S2*	8.15 *S2*						8.65 *S2*	
	Los Angeles, Torrance, Cal.		$109.00 *B2*	$139.00 *B2*		6.20 *C7, B2*	8.75 *B2*		5.85 *C7, B2*	9.30 *C1,R5*			9.60 *B2*	17.75 *J3*
	Minnequa, Colo.					5.80 *C6*			6.20 *C6*	9.375 *C6*				
	Portland, Ore.					6.25 *O2*								
	San Francisco, Niles, Pittsburg, Cal.		$109.00 *B2*			6.15 *B2*	8.70 *B2*		5.85 *C7, B2*					
	Seattle, Wash.		$109.00 *B2*	$140.00 *B2*		6.25 *B2*	8.80 *B2*		6.10 *B2*					
SOUTH	Atlanta, Ga.					5.70 *A8*			5.10 *A8*					
	Fairfield, Ala. Birmingham, Ala.	$80.00 *T2*	$99.50 *T2*			5.50 *T2 R3,C16*	8.05 *T2*		5.10 *T2, R3,C16*		7.575 *T2*			
	Houston, Lone Star, Texas		$104.50 *S2*	$124.00 *S2*		5.60 *S2*	8.15 *S2*						8.65 *S2*	

* Electro-galvanized-plus galvanizing extras

(Effective Oct. 9, 1961)

IRON AGE

STEEL PRICES

Italics identify producers listed in key at end of table. Base prices, f.o.b. mill, in cents per lb., unless otherwise noted. Extras apply.

		SHEETS								WIRE ROD	TINPLATE†		
		Hot-rolled *18* ga. & hvyr.	Cold-rolled	Galvanized (Hot-dipped)	Electro-galvanized	Enameling	Long Terne	Hi Str. Low Alloy H.R.	Hi Str. Low Alloy C.R.		Cokes▲ *1.25*-lb. base box	Electro▲▲ *0.25*-lb. base box	Thin *0.25* lb. coating in coils
EAST	**Buffalo, N. Y.**	**5.10** *B3*	**6.275** *B3*					**7.525** *B3*	**9.275** *B3*	**6.40** *W6, S15*	**†Special coated mfg. terne deduct 35¢ from 1.25-lb. coke base box price 0.75 lb./0.25 lb. add 55¢.** **Can-making quality BLACKPLATE 55 to 128 lb. deduct $2.20 from 1.25 lb. coke base box.** **▲ COKES: 1.50-lb. add 25¢.** **▲▲ELECTRO: 0.50-lb. add 25¢; 0.75-lb. add 65¢; 1.00-lb. add $1.00. Differential 1.00 lb./0.25 lb. add 65¢.**		**Prices are for 50 lb. base box; for 45 lb. deduct 15¢; for 55 lb. add 15¢; for 60 lb. add 30¢.**
	Claymont, Del.												
	Coatesville, Pa.												
	Conshohocken, Pa.	**5.15** *A2*	**6.325** *A2*					**7.575** *A2*					
	Harrisburg, Pa.												
	Hartford, Conn.												
	Johnstown, Pa.									**6.40** *B3*			
	Fairless, Pa.	**5.15** *U1*	**6.325** *U1*					**7.575** *U1*	**9.325** *U1*			**$9.10** *U1*	**$6.25** *U1*
	New Haven, Conn.												
	Phoenixville, Pa.												
	Sparrows Pt., Md.	**5.10** *B3*	**6.275** *B3*	**6.875** *B3*		**6.775** *B3*		**7.525** *B3*	**9.275** *B3* **10.025** *B3**	**6.50** *B3*	**$10.40** *B3*	**$9.10** *B3*	**$6.25** *B3*
	Worcester, Mass.									**6.70** *A5*			
MIDDLE WEST	**Alton, Ill.**									**6.60** *L1*	**Hollowware Enameling** **29 ga.—*7.85 U1* at Gary; Pittsburgh; *J3* at Aliquippa; *W5* at Yorkville; *Y1* at Indiana Harbor; *W5* at Wheeling; *7.95 G2* at Granite City.**		
	Ashland, Ky.	**5.10** *A7*		**6.875** *A7*		**6.775** *A7*		**7.525** *A7*					
	Canton-Massillon, Dover, Canfield, Ohio			**6.875** *R1, R3*	**7.50** *C19*								
	Chicago, Joliet, Ill.	**5.10** *W8, A1*						**7.525** *U1, W8*		**6.40** *A5, R3,W8*			
	Sterling, Ill.									**6.50** *N4, K2*			
	Cleveland, Ohio	**5.10** *R3, J3*	**6.275** *R3, J3*		**7.65** *R3*	**6.775** *R3*		**7.525** *R3, J3*	**9.275** *R3, J3*	**6.40** *A5*			
	Detroit, Mich.	**5.10** *G3, M2*	**6.275** *G3, M2*					**7.525** *G3*	**9.275** *G3*				
	Newport, Ky.	**5.10** *A9*	**6.275** *A9*										
	Gary, Ind. Harbor, Indiana	**5.10** *U1, I3,Y1*	**6.275** *U1, I3,Y1*	**6.875** *U1, I3*		**6.775** *U1, I3,Y1*	**7.225** *U1*	**7.525** *U1, Y1,I3*	**9.275** *U1, Y1*	**6.40** *Y1*	**$10.40** *U1, Y1*	**$9.10** *I3, U1 Y1,*	**$6.25** *U1,I3*
	Granite City, Ill.	**5.20** *G2*	**6.375** *G2*	**6.975** *G2*								**$9.20** *G2*	
	Kokomo, Ind.			**6.975** *C9*						**6.50** *C9*			
	Mansfield, Ohio	**5.10** *E2*	**6.275** *E2*				**7.225** *E2*						
	Middletown, Ohio		**6.275** *A7*	**6.875** *A7*	**7.225** *A7*	**6.775** *A7*	**7.225** *A7*						
	Niles, Warren, Ohio Sharon, Pa.	**5.10** *R3, S1*	**6.275** *R3*	**6.875** *R3*	**7.65** *R3*	**6.775** *S1*	**7.225** *S1*†† *R3*	**7.525** *R3, S1*	**9.275** *R3*			**$9.10** *R3*	
	Pittsburgh, Midland, Butler, Aliquippa, McKeesport, Pa.	**5.10** *U1, J3,P6*	**6.275** *U1, J3,P6*	**6.875** *U1, J3*	**7.50** *E3*	**6.775** *U1*		**7.525** *U1, J3*	**9.275** *U1, J3* **10.125** *U1, J3**	**6.40** *A5, J3,P6*	**$10.40** *U1, J3*	**$9.10** *U1, J3*	**$6.25** *U1, J3*
	Portsmouth, Ohio	**5.10** *P7*	**6.275** *P7*							**6.40** *P7*			
	Weirton, Wheeling, Follansbee, W. Va.	**5.10** *W3, W5*	**6.275** *W3, F3,W5*	**6.875** *W3, W5*	**7.50** *W3*		**7.225** *W3*	**7.525** *W3*	**9.275** *W3*		**$10.40** *W5, W3*	**$9.10** *W5, W3*	**$6.40** *W5*** **$6.25** *W3*
	Youngstown, Ohio	**5.10** *U1, Y1*	**6.275** *Y1*			**6.775** *Y1*		**7.525** *Y1*	**9.275** *Y1*	**6.40** *Y1*			
WEST	**Fontana, Cal.**	**5.825** *K1*	**7.40** *K1*					**8.25** *K1*	**10.40** *K1*		**$11.05** *K1*	**$9.75** *K1*	
	Geneva, Utah	**5.20** *C7*											
	Kansas City, Mo.									**6.65** *S2*			
	Los Angeles, Torrance, Cal.									**7.20** *B2*			
	Minnequa, Colo.									**6.65** *C6*			
	San Francisco, Niles, Pittsburg, Cal.	**5.80** *C7*	**7.225** *C7*	**7.625** *C7*						**7.20** *C7*	**$11.05** *C7*	**$9.75** *C7*	
SOUTH	**Atlanta, Ga.**												
	Fairfield, Ala. Alabama City, Ala.	**5.10** *T2, R3*	**6.275** *T2, R3*	**6.875** *T2, R3*		**6.775** *T2*				**6.40** *T2,R3*	**$10.40** *T2*	**$9.10** *T2*	**$6.25** *T2*
	Houston, Texas									**6.65** *S2*			

* Hi Str. Low Alloy Galv. ** For 55 lb.; for 60 lb. add 15¢.

†† 7.425 at Sharon; Niles is 7.225.

(Effective Oct. 9, 1961)

IRON AGE

STEEL PRICES

Italics identify producers listed in key at end of table. Base prices, f.o.b. mill, in cents per lb., unless otherwise noted. Extras apply.

		BARS						PLATES				WIRE
		Carbon† Steel	Reinforcing	Cold Finished	Alloy Hot-rolled	Alloy Cold Drawn	Hi Str. H.R. Low Alloy	Carbon Steel	Floor Plate	Alloy	Hi Str. Low Alloy	Mfr's. Bright
EAST	Bethlehem, Pa.				6.725 *B3*	9.025 *B3*	8.30 *B3*					
	Buffalo, N. Y.	5.675 *R3,B3, S15*	Listing reinforcing bar prices has been suspended. Major producers now quote prices only in response to specific inquiries.	7.70 *B5*	6.725 *B3,R3, S15*	9.025 *B3,B5, S15*	8.30 *B3*	5.30 *B3*				8.00 *W6, S15*
	Claymont, Del.							5.30 *P2*	6.375 *P2*	7.50 *P2*	7.95 *P2*	
	Coatesville, Pa.							5.30 *L4*		7.50 *L4*	7.95 *L4*	
	Conshohocken, Pa.							5.30 *A2*	6.375 *A2*	7.50 *A2*	7.95 *A2*	
	Milton, Pa.	5.825 *M7*										
	Hartford, Conn.			8.15 *R3*		9.325 *R3*						
	Johnstown, Pa.	5.675 *B3*			6.725 *B3*		8.30 *B3*	5.30 *B3*		7.50 *B3*	7.95 *B3*	8.00 *B3*
	Steelton, Pa.											
	Fairless, Pa.	5.825 *U1*										
	Newark, Camden, N. J.			8.10 *W10, P10*		9.20 *W10, P10*						
	Bridgeport, Putnam, Willimantic, Conn.			8.20 *W10* 8.15 *J3*	6.80 *N8*	9.175 *N8*						
	Sparrows Pt., Md.							5.30 *B3*		7.50 *B3*	7.95 *B3*	8.10 *B3*
	Palmer, Worcester, Readville, Mansfield, Mass.			8.20 *B5, C14*		9.325 *A5,B5*						8.30 *A5, W6*
	Spring City, Pa.			8.10 *K4*		9.20 *K4*						
MIDDLE WEST	Alton, Ill.	5.875 *L1*										8.20 *L1*
	Ashland, Newport, Ky.							5.30 *A7, A9*		7.50 *A9*	7.95 *A7*	
	Canton, Massillon, Mansfield, Ohio	6.15* *R3*		7.65 *R3,R2*	6.725 *R3, T5*	9.025 *R3,R2, T5*		5.30 *E2*				
	Chicago, Joliet, Waukegan, Madison, Harvey, Ill.	5.675 *U1,R3, W8,N4,P13*		7.65 *A5, W10,W8, B5,L2,N9*	6.725 *U1,R3, W8*	9.025 *A5, W10,W8, L2,N8,B5*	8.30 *U1,W8, R3*	5.30 *U1,A1, W8,I3*	6.375 *U1*	7.50 *U1, W8*	7.95 *U1, W8*	8.00 *A5,R3, W8,N4, K2,W7*
	Cleveland, Elyria, Ohio	5.675 *R3*		7.65 *A5,C13, W13*		9.025 *A5, C13,W13*	8.30 *R3*	5.30 *R3,J3*	6.375 *J3*		7.95 *R3,J3*	8.00 *A5, C13,W13*
	Detroit, Plymouth, Mich.	5.675 *G3*		7.90 *P3* 7.85 *P8B5H2* 7.65 *R5*	6.725 *R5,G3*	9.025 *R5,P8, H2* 9.225 *B5,P3*	8.30 *G3*	5.30 *G3*		7.50 *G3*	7.95 *G3*	
	Duluth, Minn.											8.00 *A5*
	Gary, Ind. Harbor, Crawfordsville, Hammond, Ind.	5.675 *U1,I3, Y1*		7.65 *R3,J3*	6.725 *U1,I3, Y1*	9.025 *R3,M4*	8.30 *U1,Y1*	5.30 *U1,I3, Y1*	6.375 *J3, Y1*	7.50 *U1, Y1*	7.95 *U1, Y1,I3*	8.10 *M4*
	Granite City, Ill.							5.40 *G2*				
	Kokomo, Ind.											8.10 *C9*
	Sterling, Ill.	5.775 *N4*					7.925 *N4*	5.30 *N4*			7.625 *N4*	8.10 *K2*
	Niles, Warren, Ohio Sharon, Pa.			7.65 *C10*	6.725 *C10,*	9.025 *C10*		5.30 *R3,S1*		7.50 *S1*	7.95 *R3, S1*	
	Owensboro, Ky.	5.675 *G5*			6.725 *G5*							
	Pittsburgh, Midland, Donora, Aliquippa, Pa.	5.675 *U1,J3*		7.65 *A5,B4, R3,J3,C11, W10,S9,C8, M9*	6.725 *U1,J3, C11,B7*	9.025 *A5, W10,R3,S9, C11,C8,M9*	8.30 *U1,J3*	5.30 *U1,J3*	6.375 *U1,J3*	7.50 *U1, J3,B7*	7.95 *U1, J3,B7*	8.00 *A5, J3,P6*
	Portsmouth, Ohio											8.00 *P7*
	Youngstown, Steubenville, O.	5.675 *U1,R3, Y1*		7.65 *A1,Y1, F2*	6.725 *U1,Y1*	9.025 *Y1,F2*	8.30 *U1,Y1*	5.30 *U1,W5, R3,Y1*		7.50 *Y1*	7.95 *U1,Y1*	8.00 *Y1*
WEST	Emeryville, Fontana, Cal.	6.375 *K1*			7.775 *K1*		9.00 *K1*	6.10 *K1*		8.30 *K1*	8.75 *K1*	
	Geneva, Utah							5.30 *C7*			7.95 *C7*	
	Kansas City, Mo.	5.925 *S2*			6.975 *S2*		8.55 *S2*					8.25 *S2*
	Los Angeles, Torrance, Cal.	6.375 *C7,B2*		9.10 *R3,P14, S12*	7.775 *B2*	11.00 *P14, B5*	9.00 *B2*					8.95 *B2*
	Minnequa, Colo.	6.125 *C6*						6.15 *C6*				8.25 *C6*
	Portland, Ore.	6.425 *O2*										
	San Francisco, Niles, Pittsburg, Cal.	6.375 *C7* 6.425 *B2*					9.05 *B2*					8.95 *C7,C6*
	Seattle, Wash.	6.425 *B2,N6, A10*			7.825 *B2*		9.05 *B2*	6.20 *B2*		8.40 *B2*	8.85 *B2*	
SOUTH	Atlanta, Ga. Jacksonville, Fla.	5.875 *A8*										8.00 *A8* 8.35 *M4*
	Fairfield, Ala. Birmingham, Ala.	5.675 *T2,R3, C16*		8.10 *C16*			8.30 *T2*	5.30 *T2,R3*			7.95 *T2*	8.00 *T2,R3*
	Houston, Ft. Worth, Lone Star, Texas, Sand Springs, Okla.	5.925 *S2*			6.975 *S2*		8.55 *S2*	5.40 *S2*		7.60 *S2*	8.05 *S2*	8.25 *S2*

† Merchant Quality—Special Quality 35¢ higher. (Effective Oct. 9, 1961) * Special Quality.

STEEL PRICES

Key to Steel Producers

With Principal Offices

A1	Acme Steel Co., Chicago
A2	Alan Wood Steel Co., Conshohocken, Pa.
A3	Allegheny Ludlum Steel Corp., Pittsburgh
A4	American Cladmetals Co., Carnegie, Pa.
A5	American Steel & Wire Div., Cleveland
A6	Angel Nail & Chaplet Co., Cleveland
A7	Armco Steel Corp., Middletown, Ohio
A8	Atlantic Steel Co., Atlanta, Ga.
A9	Acme-Newport Steel Co., Newport, Ky.
A10	Alaska Steel Mills, Inc., Seattle, Wash.
B1	Babcock & Wilcox Tube Div., Beaver Falls, Pa.
B2	Bethlehem Steel Co., Pacific Coast Div.
B3	Bethlehem Steel Co., Bethlehem, Pa.
B4	Blair Strip Steel Co., New Castle, Pa.
B5	Bliss & Laughlin, Inc., Harvey, Ill.
B6	Brooke Plant, Wickwire-Spencer Steel Div., Birdsboro, Pa.
B7	A. M. Byers, Pittsburgh
B8	Braeburn Alloy Steel Corp., Braeburn, Pa.
B9	Barry Universal Corp., Detroit, Mich.
C1	Calstrip Steel Corp., Los Angeles
C2	Carpenter Steel Co., Reading, Pa.
C6	Colorado Fuel & Iron Corp., Denver
C7	Columbia Geneva Steel Div., San Francisco
C8	Columbia Steel & Shafting Co., Pittsburgh
C9	Continental Steel Corp., Kokomo, Ind.
C10	Copperweld Steel Co., Pittsburgh, Pa.
C11	Crucible Steel Co. of America, Pittsburgh
C13	Cuyahoga Steel & Wire Co., Cleveland
C14	Compressed Steel Shafting Co., Readville, Mass.
C15	G. O. Carlson, Inc., Thorndale, Pa.
C16	Connors Steel Div., Birmingham
C19	Canfield Steel Co., Canfield, O.
D1	Detroit Steel Corp., Detroit
D2	Driver, Wilbur B., Co., Newark, N. J.
D3	Driver Harris Co., Harrison, N. J.
D4	Dickson Weatherproof Nail Co., Evanston, Ill.
E1	Eastern Stainless Steel Corp., Baltimore
E2	Empire-Reeves Steel Corp., Mansfield, O.
E3	Enamel Products & Plating Co., McKeesport, Pa.
F1	Firth Sterling, Inc., McKeesport, Pa.
F2	Fitzsimons Steel Corp., Youngstown
F3	Follansbee Steel Corp., Follansbee, W. Va.
G2	Granite City Steel Co., Granite City, Ill.
G3	Great Lakes Steel Corp., Detroit
G4	Greer Steel Co., Dover, O.
G5	Green River Steel Corp., Owenboro, Ky.
H1	Hanna Furnace Corp., Detroit
H2	Hercules Drawn Steel Corp., Toledo, O.
I2	Ingersoll Steel Div., New Castle, Ind.
I3	Inland Steel Co., Chicago, Ill.
I4	Interlake Iron Corp., Cleveland
J1	Jackson Iron & Steel Co., Jackson, O.
J2	Jessop Steel Corp., Washington, Pa.
J3	Jones & Laughlin Steel Corp., Pittsburgh
J4	Joslyn Mfg. & Supply Co., Chicago
J5	Judson Steel Corp., Emeryville, Calif.
K1	Kaiser Steel Corp., Fontana, Calif.
K2	Keystone Steel & Wire Co., Peoria
K4	Keystone Drawn Steel Co., Spring City, Pa.
L1	Laclede Steel Co., St. Louis
L2	La Salle Steel Co., Chicago
L3	Lone Star Steel Co., Dallas
L4	Lukens Steel Co., Coatesville, Pa.
M1	Mahoning Valley Steel Co., Niles, O.
M2	McLouth Steel Corp., Detroit
M3	Mercer Tube & Mfg. Co., Sharon, Pa.
M4	Mid States Steel & Wire Co., Crawfordsville, Ind.
M7	Milton Steel Products Div., Milton, Pa.
M8	Mill Strip Products Co., Evanston, Ill.
M9	Moltrup Steel Products Co., Beaver Falls, Pa.
M10	Mill Strip Products Co., of Pa., New Castle, Pa.
N1	National Supply Co., Pittsburgh
N2	National Tube Div., Pittsburgh
N4	Northwestern Steel & Wire Co., Sterling, Ill.
N6	Northwest Steel Rolling Mills, Seattle
N7	Newman Crosby Steel Co., Pawtucket, R. I.
N8	Carpenter Steel of New England, Inc., Bridgeport, Conn.
N9	Nelson Steel & Wire Co.
O1	Oliver Iron & Steel Co., Pittsburgh
O2	Oregon Steel Mills, Portland
P1	Page Steel & Wire Div., Monessen, Pa.
P2	Phoenix Steel Corp., Phoenixville, Pa.
P3	Pilgrim Drawn Steel Div., Plymouth, Mich.
P4	Pittsburgh Coke & Chemical Co., Pittsburgh
P6	Pittsburgh Steel Co., Pittsburgh
P7	Portsmouth Div., Detroit Steel Corp., Detroit
P8	Plymouth Steel Co., Detroit
P9	Pacific States Steel Co., Niles, Cal.
P10	Precision Drawn Steel Co., Camden, N. J.
P11	Production Steel Strip Corp., Detroit
P13	Phoenix Mfg. Co., Joliet, Ill.
P14	Pacific Tube Co.
P15	Philadelphia Steel and Wire Corp.
R1	Reeves Steel & Mfg. Div., Dover, O.
R2	Reliance Div., Eaton Mfg. Co., Massillon, O.
R3	Republic Steel Corp., Cleveland
R4	Roebling Sons Co., John A., Trenton, N. J.
R5	Jones & Laughlin Steel Corp., Stainless and Strip Div.
R6	Rodney Metals, Inc., New Bedford, Mass.
R7	Rome Strip Steel Co., Rome, N. Y.
S1	Sharon Steel Corp., Sharon, Pa.
S2	Sheffield Steel Div., Kansas City
S3	Shenango Furnace Co., Pittsburgh
S4	Simonds Saw and Steel Co., Fitchburg, Mass.
S5	Sweet's Steel Co., Williamsport, Pa.
S7	Stanley Works, New Britain, Conn.
S8	Superior Drawn Steel Co., Monaca, Pa.
S9	Superior Steel Div. of Copperweld Steel Co.
S10	Seneca Steel Service, Buffalo
S11	Southern Electric Steel Co., Birmingham
S12	Sierra Drawn Div., Bliss & Laughlin, Inc., Los Angeles, Calif.
S13	Seymour Mfg. Co., Seymour, Conn.
S14	Screw and Bolt Corp. of America, Pittsburgh, Pa.
S15	Seaway Steel Div., Roblin-Seaway Ind., Inc., North Tonawanda, N. Y.
T1	Tonawanda Iron Div., N. Tonawanda, N. Y.
T2	Tennessee Coal & Iron Div., Fairfield
T3	Tennessee Products & Chem. Corp., Nashville
T4	Thomas Strip Div., Warren, O.
T5	Timken Steel & Tube Div., Canton, O.
T7	Texas Steel Co., Fort Worth
T8	Thompson Wire Co., Boston
U1	United States Steel Corp., Pittsburgh
U2	Universal-Cyclops Steel Corp., Bridgeville, Pa.
U3	Ulbrich Stainless Steels, Wallingford, Conn.
U4	U. S. Pipe & Foundry Co., Birmingham
W1	Wallingford Steel Co., Wallingford, Conn.
W2	Washington Steel Corp., Washington, Pa.
W3	Weirton Steel Co., Weirton, W. Va.
W4	Wheatland Tube Co., Wheatland, Pa.
W5	Wheeling Steel Corp., Wheeling, W. Va.
W6	Wickwire Spencer Steel Div., Buffalo
W7	Wilson Steel & Wire Co., Chicago.
W8	Wisconsin Steel Div., S. Chicago, Ill.
W9	Woodward Iron Co., Woodward, Ala.
W10	Wyckoff Steel Co., Pittsburgh
W12	Wallace Barnes Steel Div., Bristol, Conn.
W13	Western Cold Drawn Steel, Div. of Standard Screw Co., Elyria, O.
Y1	Youngstown Sheet & Tube Co., Youngstown, O.

STEEL SERVICE CENTER PRICES

Metropolitan Price, dollars per 100 lb.

Cities	City Delivery‡ Charge	Sheets			Strip	Plates	Shapes	Bars		Alloy Bars			
		Hot-Rolled (18 ga. & hvr.)	Cold-Rolled (15 gage)	Galvanized (10 gage)††	Hot-Rolled		Standard Structural	Hot-Rolled (merchant)	Cold-Finished	Hot-Rolled 4615 As rolled	Hot-Rolled 4140 Annealed	Cold-Drawn 4615 As rolled	Cold-Drawn 4140 Annealed
Atlanta		9.37	10.61	11.83	10.85	9.73	9.94	9.53	13.24	......	......	......	......
Baltimore	$.10	9.60	10.36	10.16	11.35	9.70	9.95	9.75	11.80	17.48	16.48	21.58	20.83
Birmingham		9.11	11.00	11.39	10.10	9.06	9.12	8.91	13.14	18.84	16.65	22.94	22.19
Boston**	.10	10.02	10.50	11.62	12.50	9.93	10.60	10.15	13.45	17.69	16.69	21.79	21.04
Buffalo**	.15	9.45	10.20	11.95	11.85	9.55	10.05	9.60	11.60	17.45	16.45	21.55	20.80
Chicago**	.15	9.37	10.35	10.28	11.54	9.21	9.72	9.37	10.80	17.10	16.10	21.20	20.45
Cincinnati**	.15	9.53	10.41	10.33	11.86	9.59	10.29	9.48	11.68	17.42	16.42	21.52	20.77
Cleveland**	.15	9.37[1]	10.81	11.07	11.66	9.45	10.11	9.48	11.40	17.21	16.21	21.31	20.56
Denver		11.55	12.53	13.03	13.72	11.39	11.90	11.55	12.98	......	......	......	20.84
Detroit**	.15	9.63	10.61	10.65	11.91	9.58	10.29	9.68	11.16	17.38	16.38	21.48	20.73
Houston**		8.67	9.48	11.35[3]	10.23	8.00	8.31	8.08	13.10	17.50	16.55	21.55	20.85
Kansas City	.15	10.53	11.37	10.95	12.70	10.39	10.91	10.55	11.72	17.17	15.87	21.87	21.12
Los Angeles		10.35[1]	12.15	12.10	12.40	10.30	10.45	10.25	14.20	18.30	17.35	22.90	22.20
Memphis	.15	9.78	10.50	10.95	11.44	9.47	9.82	9.63	12.85	18 59	16 68	22 69	21 04
Milwaukee**	.15	9.51	10.49	10.42	11.68	9.35	9.94	9.51	11.04	17.24	16.24	21.34	20.59
New York**	.10	10.17	10.88	11.45	12.47	10.32	11.00	10.54	13.35	17.50	16.50	21.60	20.85
Norfolk	.20	8.20	......	......	8.90	8.65	9.20	8.90	10.70	......	......	......	......
Philadelphia	.10	9.60	10.10	10.76	11.35	9.70	9.95	9.75	12.05	17.48	16.48	21.58	20.83
Pittsburgh**	.15	9.37	10.68	11.83	11.64	9.21	9.72	9.37	11.40	17.10	16.10	21.20	20.45
Portland		10.40	12.25	12.35	12.40	10.55	11.00	10.40	16.65	18.60	17.85	22.70	22.15
San Francisco	.10	10.75	11.75[2]	11.85	12.80	10.90	11.20	10.65	15.20	18.30	17.35	22.90	22.20
Seattle		11.35	12.45	13.40	12.80	10.95	11.50	10.80	16.20	18.60	17.85	22.70	22.15
Spokane	.15	11.35	12.45	13.40	12.80	10.95	11.50	10.80	16.35	17.75	17.95	21.58	22.30
St. Louis**	.15	9.57	10.73	10.66	11.74	9.43	9.95	9.59	11.43	17.48	16.48	21.58	20.83
St. Paul	.15	8.97	9.64	10.79	11.14	8.81	9.32	8.97	11.64	......	16.69	21 79	21.04

Base Quantities (Standard unless otherwise keyed): Cold finished bars: 2000 lb or over. Alloy bars: 1000 to 1999 lb. All others: 2000 to 4999 lb. All HR products may be combined for quantity. All galvanized sheets may be combined for quantity. CR sheets may be combined with each other for quantity. **These cities are on order quantity pricing. Prices shown are for 2000 lb item quantities of the following: Hot-rolled sheet—10 ga. x 36 x 96—120; Cold-rolled sheet—20 ga x 36 x 96—120; Galv. sheet—10 ga x 36—120; Hot-rolled strip—⅛" x 1"; Plate—¼" x 84"; Shapes—I-Beams 6 x 12.5; Hot-rolled bar—Rounds—¾-2 15/16; Cold-finished bar—C 1018—1" rounds; Alloy bar—hot-rolled 4615—1⅝" to 2⅞"; cold drawn—15/16" to 2⅞" round; Hot-rolled 4140—⅝" to 2⅞" round, cold drawn—15/16" to 2⅞" round.

†† 13¢ zinc. ‡ Deduct for country delivery. [1] 15 ga. & heavier; [2] 14 ga. & lighter. [3] 10 ga. x 48 — 120.

(Effective Oct. 9, 1961)

PIG IRON

Dollars per gross ton, f.o.b., subject to switching charges.

Producing Point	Basic	Fdry.	Mall.	Bess.	Low Phos.
Birdsboro, Pa. *B6*	68.00	68.50	69.00	69.50	73.00
Birmingham *R3*	62.00	62.50*	66.50	....	....
Birmingham *W9*	62.00	62.50*	66.50	....	....
Birmingham *U4*	62.00	62.50*	66.50	....	....
Buffalo *R3*	66.00	66.50	67.00	67.50	....
Buffalo *H1*	66.00	66.50	67.00	67.50	71.50†
Buffalo *W6*	66.00	66.50	67.00	67.50	....
Chester *P2*	68.00	68.50	69.00	....	....
Chicago *I4*	66.00	66.50	66.50	67.00	71.00†
Cleveland *A5*	66.00	66.50	66.50	67.00	71.00†
Cleveland *R3*	66.00	66.50	66.50	67.00	....
Duluth *I4*	66.00	66.50	66.50	67.00	71.00†
Erie *I4*	66.00	66.50	66.50	67.00	71.00†
Fontana *K1*	75.00	75.50	....	....	....
Geneva, Utah *C7*	66.00	66.50	....	....	....
Granite City *G2*	67.90	68.40	68.90	....	....
Hubbard *Y1*	....	....	66.50	....	....
Ironton, Utah *C7*	66.00	66.50	....	....	....
Lyles, Tenn. *T3*	....	....	....	....	73.00
Midland *C11*	66.00	....	....	....	....
Minnequa *C6*	68.00	68.50	69.00	....	....
Monessen *P6*	66.00	....	....	....	....
Neville Is. *P4*	66.00	66.50	66.50	67.00	71.00†
N. Tonawanda *T1*	....	66.50	67.00	67.50	....
Rockwood *T3*	62.00	62.50	66.50	67.00	73.00
Sharpsville *S3*	66.00	....	66.50	67.00	....
So. Chicago *R3*	66.00	66.50	66.50	67.00	....
So. Chicago *W8*	66.00	....	66.50	67.00	....
Swedeland *A2*	68.00	68.50	69.00	69.50	71.00†
Toledo *I4*	66-00	66.50	66.50	67.00	....
Troy, N. Y. *R3*	68.00	68.50	69.00	69.50	73.00
Youngstown *Y1*	....	....	66.50	....	....

DIFFERENTIALS: Add, 75¢ per ton for each 0.25 pct silicon or portion thereof over base (1.75 to 2.25 pct except low phos., 1.75 to 2.00 pct) 50¢ per ton for each 0.25 pct manganese or portion thereof over 1 pct, $2 per ton for 0.50 to 0.75 pct nickel, $1 for each additional 0.25 pct nickel.

Add $1.00 for 0.31-0.69 pct phos. Add 50¢ per gross ton for truck loading charge.

Silvery Iron: Buffalo (6 pct), *H1*, $79.25; Jackson *J1*, *I4*, Toledo, *I4*, $78.00; Niagara Falls (15.01-15.50), $101.00; Keokuk (14.01-14.50), $89.00; (15.51-16.00), $92.00. Add 75¢ per ton for each 0.50 pct silicon over base (6.01 to 6.50 pct) up to 13 pct; 13 to 13.5 pct; 13.5 to 14 pct, add $1. Add $1.00 for each 0.50 pct manganese over 1.00 pct.

† Intermediate low phos.

FASTENERS

(Base discounts, f.o.b. mill, based on latest list prices)

Hex Screws and All Bolts Including Hex & Hex, Square Machine, Carriage, Lag, Plow, Step, and Elevator

(Discount for 1 container)	*Pct*
Plain finish—packaged and bulk.	43
Hot galvanized and zinc plated—packaged	39.25
Hot galvanized and zinc plated—bulk	43

Nuts: Hexagon and Square, Hex, Heavy Hex, Thick Hex & Square

(Discount for 1 container)	*Pct*
Plain finish—packaged and bulk.	43
Hot galvanized and zinc plated—packaged	39.25
Hot galvanized and zinc plated—bulk	43

Hexagon Head Cap Screws—UNC or UNF Thread—Bright & High Carbon

(Discount for 1 container)

Plain finish—packaged and bulk.	43
Hot galvanized and zinc plated—packaged	39.25
Hot galvanized and zinc plated—bulk	43

(Minimum plating charge — $10.00 per item. Price on application assembled to bolts.)

Machine Screws and Stove Bolts

(Packages—plain finish)

	Discount Screws	Discount Bolts
Full Cartons	46	46

Machine Screws—bulk

¼ in. diam or smaller	25,000 pcs	50
5/16, ⅜ & ½ in. diam	15,000 pcs	50

STAINLESS STEEL

Base price cents per lb. f.o.b. mill

Product	201	202	301	302	303	304	316	321	347	403	410	416	430
Ingots, reroll.	22.75	24.75	24.00	26.25	—	28.00	41.25	33.50	38.50	—	17.50	—	17.75
Slabs, billets	25.00	28.25	26.00	29.50	32.00	29.50	47.50	38.00	46.50	—	19.25-21.50	—	19.75-21.75
Billets, forging	—	37.75	38.75	39.50	42.50	39.50	64.50	48.75	57.75	26.75	29.25-26.75	29.75	29.75
Bars, struct.	43.50	44.50	46.00	46.75	49.75	46.75	75.75	57.50	67.25	31.50	35.00-31.50	35.50	35.50
Plates	39.25	40.00	41.25	42.25	45.00	42.25	71.75	54.75	64.75	30.00	30.00	31.25 31.75	31.00
Sheets	48.50	49.25	51.25	52.00	56.75	52.00	80.75	65.50	79.25	40.25	40.25	48.25	40.75
Strip, hot-rolled	36.00	39.00	37.25	40.50	—	40.50	68.50	53.50	63.50	—	31.00	—	32.00
Strip, cold-rolled	43.50	46.75	45.00	49.50	56.75	49.50	76.75	62.25	75.25	40.25	40.25	42.50	38.75
Wire CF; Rod HR	—	42.25	43.50	44.25	47.25	44.25	71.75	54.50	63.75	29.75	33.25-29.75	33.75	33.75

STAINLESS STEEL PRODUCING POINTS:

Sheets: Midland, Pa., *C11;* Brackenridge, Pa., *A3;* Butler, Pa., *A7;* Vandergrift, Pa., *U1;* Washington, Pa., *W2, J2;* Baltimore, *E1;* Middletown, O., *A7;* Massillon, O., *R3;* Gary, *U1;* Bridgeville, Pa., *U2;* New Castle, Ind., *I2;* Detroit, *M2;* Louisville, O., *R5.*

Strip: Midland, Pa., *C11;* Waukegan, Cleveland, *A5;* Carnegie, Pa., *S9;* McKeesport, Pa., *F1;* Reading, Pa., *C2;* Washington, Pa., *W2;* W. Leechburg, Pa., *A3;* Bridgeville Pa., *U2;* Detroit, *M2;* Detroit, *S1;* Canton, Massillon, O., *R3;* Harrison, N. J., *D3;* Youngstown, *R5;* Sharon, Pa., *S1;* Butler, Pa., *A7*, Wallingford, Conn., *U3* (plus further conversion extras); *W1* (25¢ per lb. higher); Seymour, Conn., *S13*, (25¢ per lb. higher); New Bedford, Mass., *R6;* Gary, *U1*, (25¢ per lb. higher); Baltimore, Md., *E1* (300 series only).

Bar: Baltimore, *A7;* S. Duquesne, Pa., *U1;* Munhall, Pa., *U1;* Reading, Pa., *C2;* Titusville, Pa., *U2;* Washington, Pa., *J2;* McKeesport, Pa., *U1, F1;* Bridgeville, Pa., *U2;* Dunkirk, N. Y., *A3;* Massillon, O., *R5;* S. Chicago, *U1;* Syracuse, N. Y., *C11;* Watervliet, N. Y., *A3;* Waukegan, *A5;* Canton, O., *T5, R3;* Ft. Wayne, *I4;* Detroit, *R5;* Gary, *U1;* Owensboro, Ky., *G5;* Bridgeport, Conn., *N8;* Ambridge, Pa., *B7.*

Wire: Waukegan, *A5;* Massillon, O., *R3;* McKeesport, Pa., *F1;* Ft. Wayne, *J4;* Newark, N. J. *D2;* Harrison, N. J., *D3;* Baltimore, *A7;* Dunkirk, *A3;* Monessen, *P1;* Syracuse, *C11;* Bridgeville, *U2;* Detroit, *R5;* Reading, Pa., *C2;* Bridgeport, Conn., *N8* (down to and including ¼").

Structurals: Baltimore, *A7;* Massillon, O., *R3;* Chicago, Ill., *J4;* Watervliet, N. Y., *A3;* Syracuse, *C11;* S. Chicago, *U1.*

Plates: Ambridge, Pa., *B7;* Baltimore, *E1;* Brackenridge, Pa., *A3;* Chicago, *U1;* Munhall, Pa., *U1;* Midland, Pa., *C11;* New Castle, Ind., *I2;* Middletown, *A7;* Washington, Pa., *J2;* Cleveland, Massillon, *R3;* Coatesville, Pa., *C15;* Vandergrift, Pa., *U1;* Gary, *U1:* Claymont, Del; *P2.*

Forging billets: Ambridge Pa., *B7;* Midland, Pa., *C11;* Baltimore, *A7;* Washington, Pa., *J2;* McKeesport, *F1;* Massillon, Canton, O., *R3;* Watervliet, *A3;* Pittsburgh, Chicago, *U1;* Syracuse, *C11;* Detroit, *R5;* Munhall, Pa., S. Chicago, *U1;* Owensboro, Ky., *G5;* Bridgeport, Conn., *N8;* Reading, Pa., *C2.*

Machine Screw and Stove Bolt Nuts

(Packages—plain finish)

	Discount Hex	Discount Square
Full Cartons	46	57
Bulk		
¼ in. diam or smaller	25,000 pcs	
5/16 or ⅜ in. diam	56	60
	15,000 pcs	
	56	60

Rivets

	Base per 100 *lb*
½ in. diam and larger	$12.85
	Pct Off List
7/16 in. and smaller	15

NOTE: Ferroalloy prices are published in alternate issues.

TOOL STEEL

F.o.b. mill

W	Cr	V	Mo	Co	per lb	AISI
18	4	1	—	—	$1.84	T-1
18	4	1	—	5	2.545	T-4
18	4	2	—	—	2.005	T-2
1.5	4	1.5	8	—	1.20	M-1
6	4	3	6	—	1.59	M-3
6	4	2	5	—	1.345	M-2
High-carbon chromium					.955	D-3, D-5
Oil hardened manganese					.505	O-2
Special carbon					.38	W-1
Extra carbon					.38	W-1
Regular carbon					.325	W-1

Warehouse prices on and east of Mississippi are 4¢ per lb higher. West of Mississippi, 6¢ higher.

LAKE SUPERIOR ORES

51.50% Fe natural, delivered lower Lake ports. Interim prices for 1960 season. Freight changes for seller's account.

	Gross Ton
Openhearth lump	$12.70
Old range, bessemer	11.85
Old range, nonbessemer	11.70
Mesabi, bessemer	11.60
Mesabi, nonbessemer	11.45
High phosphorus	11.45

(Effective Oct. 9, 1961)

MERCHANT WIRE PRODUCTS

F.o.b. Mill	Standard & Coated Nails Col	Woven Wire Fence Col	"T" Fence Posts Col	Single Loop Bale Ties Col	Galv. Barbed and Twisted Barbless Wire Col	Merch. Wire Ann'ld ¢/lb.	Merch. Wire Galv. ¢/lb.
Alabama City *R3*	173	187	...	212	193	9.00	9.55
Aliquippa *J3****	173	190	...	...	190	9.00	9.675
Atlanta *A8***	173	191	...	212	197	9.00	9.75
Bartonville *K2***	175	193	183	214	199	9.10	9.85
Buffalo *W6*	.....	.....	...	...	.....	9.00	9.55*
Chicago *N4*	173	191	177	212	197	9.00	9.75
Chicago *R3*	.....	.....	...	...	.....	9.00	9.55
Chicago *W7*	173	.....	...	...	.....	9.00	9.55†
Cleveland *A6*	.....	.....	...	...	.....	.....	....
Cleveland *A5*	.....	.....	...	...	.....	9.00	....
Crawf'dsv. *M4***	175	192	...	214	198	9.10	9.80
Donora Pa. *A5*	173	187	...	212	193	9.00	9.55
Duluth *A5*	173	187	177	212	193	9.00	9.55
Fairfield, Ala. *T2*	173	187	...	212	193	9.00	9.55
Galveston *D4*	9.10‡	.....	...	...	.....	.....	....
Houston *S2**	178	192	...	217	198	9.25	9.80†
Jacksonville *M4*	175	192	...	214	198	9.10	9.80††
Johnstown *B3***	173	190	177	...	196	9.00	9.675
Joliet Ill. *A5*	173	187	...	212	193	9.00	9.55
Kokomo *C9**	175	189	...	214	195*	9.10	9.65*
L. Angeles *B2****	.....	.....	...	...	.....	9.95	10.625
Kansas City *S2**	178	192	...	217	198*	9.25	9.80†
Minnequa *C6*	178	192	182	217	198†	9.25	9.80†
Palmer, Mass. *W6*	.....	.....	...	...	.....	9.30	9.85*
Pittsburg, Cal. *C7*	192	210	...	...	213	9.95	10.50
Rankin Pa. *A5*	173	187	...	...	193	9.00	9.55
So. Chicago *R3*	173	187	...	...	193	8.65	9.20
S. San Fran. *C6*	.....	.....	...	236	.....	9.95	10.50
SparrowsPt. *B3***	175	.....	...	215	198	9.10	9.775
Struthers, O. *Y1**	.....	.....	...	...	.....	8.65	9.20
Worcester *A5*	179	.....	...	...	.....	9.30	9.85
Williamsport *S5*	.....	.....	...	...	.....	.....	....

* Zinc less than .10¢. *** .10¢ zinc.
** 13-13.5¢ zinc. † Plus zinc extras.
‡ Wholesalers only. †† 0.115¢ zinc.

PIPE AND TUBING

Base discounts (pct) f.o.b. mills. Base price about $200 per net ton.

	BUTTWELD														SEAMLESS							
	½ In.		¾ In.		1 In.		1¼ In.		1½ In.		2 In.		2½–3 In.		2 In.		2½ In.		3 In.		3½–4 In.	
STANDARD T. & C.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.
Sparrows Pt. *B3*	0.25	+15.0	3.25	+11.0	6.75	+6.50	9.25	+5.75	9.75	+4.75	10.25	+4.25	11.75	+4.50	......	......	......	......	......	......	......	......
Youngstown *R3*	2.25	+13.0	5.25	+9.0	8.75	+4.50	11.25	+3.75	11.75	+2.75	12.25	+2.25	13.75	+2.50	......	......	......	......	......	......	......	......
Fontana *K1*	+10.75	+26.00	+7.75	+22.00	+4.25	+17.50	+1.75	+16.75	+1.25	+15.75	+0.75	+15.25	0.75	+15.50	......	......	......	......	......	......	......	......
Pittsburgh *J3*	2.25	+13.0	5.25	+9.0	8.75	+4.50	11.25	+3.75	11.75	+2.75	12.25	+2.25	13.75	+2.50	+12.25	+27.25	+5.75	+22.50	+3.25	+20.0	+1.75	+18.50
Alton, Ill. *L1*	0.25	+15.0	3.25	+11.0	6.75	+6.50	9.25	+5.75	9.75	+4.75	10.25	+4.25	11.75	+4.50	......	......	......	......	......	......	......	......
Sharon *M3*	2.25	+13.0	5.25	+9.0	8.75	+4.50	11.25	+3.75	11.75	+2.75	12.25	+2.25	13.75	+2.50	......	......	......	......	......	......	......	......
Fairless *N2*	0.25	+15.0	3.25	+11.0	6.75	+6.50	9.25	+5.75	9.75	+4.75	10.25	+4.25	11.75	+4.50	......	......	......	......	......	......	......	......
Pittsburgh *N1*	2.25	+13.0	5.25	+9.0	8.75	+4.50	11.25	+3.75	11.75	+2.75	12.25	+2.25	13.75	+2.50	+12.25	+27.25	+5.75	+22.50	+3.25	+20.0	+1.75	+18.50
Wheeling *W5*	2.25	+13.0	5.25	+9.0	8.75	+4.50	11.25	+3.75	11.75	+2.75	12.25	+2.25	13.75	+2.50	......	......	......	......	......	......	......	......
Wheatland *W4*	2.25	+13.0	5.25	+9.0	8.75	+4.50	11.25	+3.75	11.75	+2.75	12.25	+2.25	13.75	+2.50	......	......	......	......	......	......	......	......
Youngstown *Y1*	2.25	+13.0	5.25	+9.0	8.75	+4.50	11.25	+3.75	11.75	+2.75	12.25	+2.25	13.75	+2.50	+12.25	+27.25	+5.75	+22.50	+3.25	+20.0	+1.75	+18.50
Indiana Harbor *Y1*	1.25	+14.0	4.25	+10.0	7.75	+5.50	10.25	+4.75	10.75	+3.75	11.25	+3.25	12.75	+3.50	......	......	......	......	......	......	......	......
Lorain *N2*	2.25	+13.0	5.25	+9.0	8.75	+4.50	11.25	+3.75	11.75	+2.75	12.25	+2.25	13.75	+2.50	+12.25	+27.25	+5.75	+22.50	+3.25	+20.0	+1.75	+18.50
EXTRA STRONG PLAIN ENDS																						
Sparrows Pt. *B3*	4.75	+9.0	8.75	+5.0	11.75	+0.50	12.25	+1.75	12.75	+0.75	13.25	+0.25	13.75	+1.50	......	......	......	......	......	......	......	......
Youngstown *R3*	6.75	+7.0	10.75	+3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50	......	......	......	......	......	......	......	......
Fairless *N2*	4.75	+9.0	8.75	+5.0	11.75	+0.50	12.25	+1.75	12.75	+0.75	13.25	+0.25	13.75	+1.50	......	......	......	......	......	......	......	......
Fontana *K1*	+6.25	......	+2.25	......	0.75	......	1.25	......	1.75	......	2.25	......	2.75	......	......	......	......	......	......	......	......	......
Pittsburgh *J3*	6.75	+7.0	10.75	+3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50	+10.75	+24.75	+3.25	+19.0	+0.75	+16.50	4.25	+11.50
Alton, Ill. *L1*	4.75	+9.0	8.75	+5.0	11.75	+0.50	12.25	+1.75	12.75	+0.75	13.25	+0.25	13.75	+1.50	......	......	......	......	......	......	......	......
Sharon *M3*	6.75	+7.0	10.75	+3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50	......	......	......	......	......	......	......	......
Pittsburgh *N1*	6.75	+7.0	10.75	+3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50	+10.75	+24.75	+3.25	+19.0	+0.75	+16.50	4.25	+11.50
Wheeling *W5*	6.75	+7.0	10.75	+3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50	......	......	......	......	......	......	......	......
Wheatland *W4*	6.75	+7.0	10.75	+3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50	......	......	......	......	......	......	......	......
Youngstown *Y1*	6.75	+7.0	10.75	+3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50	+10.75	+24.75	+3.25	+19.0	+0.75	+16.50	4.25	+11.50
Indiana Harbor *Y1*	5.75	+8.0	9.75	+4.0	12.75	0.50	13.25	+0.75	13.75	0.25	14.25	0.75	14.75	+0.50	......	......	......	......	......	......	......	......
Lorain *N2*	6.75	+7.0	10.75	+3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50	+10.75	+24.75	+3.25	+19.0	+0.75	+16.50	4.25	+11.50

Threads only, buttweld and seamless, 2¼ pt. higher discount. Plain ends, buttweld and seamless, 3-in. and under, 5½ pt. higher discount.

Galvanized discounts based on zinc price range of over 9¢ to 11¢ per lb. East St. Louis. For each 2¢ change in zinc, discounts vary as follows: ½, ¾ and 1-in., 2 pt.; 1¼, 1½ and 2-in., 1½ pt.; 2½ and 3-in., 1 pt., e.g., zinc price range of over 13¢ to 15¢ would lower discounts on 2½ and 3-in. pipe by 2 points; zinc price in range over 7¢ to 9¢ would increase discounts. East St. Louis zinc price now 11.50¢ per lb.

CAST IRON WATER PIPE INDEX

Birmingham	125.8
New York	138.6
Chicago	140.0
San Francisco-L. A.	148.6

Dec. 1955, value, Class B or heavier 5 in. or larger, bell and spigot pipe. Explanation: p. 57, Sept. 1, 1955, issue. Source: U. S. Pipe and Foundry Co.

COKE

Furnace, beehive (f.o.b.)	Net-Ton
Connellsville, Pa.	$14.75 to $15.50
Foundry, beehive (f.o.b.)	$18.50
Foundry oven coke	
Buffalo, del'd	$33.70
Chattanooga, Tenn.	30.80
Ironton, O., f.o.b.	30.50
Detroit, f.o.b.	32.00
New Haven, f.o.b.	31.00
Kearny, N. J., f.o.b.	31.25
Philadelphia, f.o.b.	31.00
Swedeland, Pa., f.o.b.	31.00
Painesville, Ohio, f.o.b.	32.00
Erie, Pa., f.o.b.	32.00
St. Paul, f.o.b.	31.25
St Louis, f.o.b.	33.00
Birmingham, f.o.b.	30.35
Milwaukee, f.o.b.	32.00
Neville Is., Pa.	30.75

THE LITTLE AND THE BIG IN PERFORATED MATERIALS

Standard Mundt perforations range from 950 holes per square inch to 0.046 holes per square inch in round hole patterns. You'll find equal variety in square, oblong, diagonal, diamond, herringbone and other decorative and functional patterns.

Mundt perforates all basic metals and alloys as well as bonded, coated, clad and textured metals, plastics, plywood, fibre and wood. Where a product has not been previously perforated, we will make an experimental run without charge to determine perforating qualities.

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CHESTER, PA.

FERROALLOY PRICES

NOTE: Prices of Boiler Tubes, Clad Steel, C-R Spring Steel, Electrical Sheets, Electrodes, Electroplating Supplies, Metal Powders, Rails and Track Supplies, and Refractories are published in alternate issues.

Ferrochrome (*Effective Oct. 15*)

Base prices per lb of contained chromium, carload lots of lump material in bulk, unless noted.

High-Carbon

4.00-6.00% C, 55-63% Cr, 8-12% Si, .03% max S	23.00
4.00-7.00% C, 67-71% Cr, 1-2% Si	24.00
4.25% max C, 58-65% Cr, 1% max Si, .03% max S	24.00
5.25% max C, 58-65% Cr, 3% max Si, .03% max S	22.00

Low-Carbon

2.00% max C, 65-71% Cr, 2% max Si	32.50
.75% max C, 67-73% max Cr, 2% max Si	33.00
.025% max C, 68-73% Cr, 2% max Si	33.50
.05% max C, 67-73% Cr, 2% max Si	33.00
.05% max C, 63-67% Cr, 4-6% Si	32.50

Bricks or Pellets

.025% max C, 63-68% Cr, 4-7% Si	32.50
.025% max C, 68-71% Cr, 2% max Si	33.00
.010% max C, 63-68% Cr, 4-7% Si	33.00
.010% max C, 68-71% Cr, 2% max Si	33.50

High Nitrogen Ferrochrome

Low-carbon type 0.75% N. Add 5¢ per lb to regular low carbon ferrochrome max. 0.10% C price schedule.

Ferrochrome Silicon

Carloads, delivered lump, per lb of material.

39-41% Cr, .05% max C, 42-45% Si	11.50
44-47% Cr, .15% max C, 37-39% Si	12.60

Chromium Metal

Per lb chromium, contained, packed delivered, ton lots, 97.25% min. Cr, 1% max. Fe.

0.10% max. C	$1.29
9 to 11% C, 88-91% Cr, 0.75% Fe	1.38

Electrolytic Chromium Metal

Per lb of metal 2" x D plate (⅛" thick) delivered packed, 99.80% min. Cr. (Metallic Base) Fe 0.20 max.

Carloads	$1.15
Ton lots	1.17
Less ton lots	1.19

Calcium-Silicon

Per lb of alloy, lump, delivered, packed. 30-33% Cr, 60-65% Si, 3.00 max. Fe.

Carloads, bulk	24.00
Ton lots	27.95
Less ton lots	29.45

Calcium-Maganese—Silicon

Cents per lb of alloy, lump, delivered, packed.

16-20% Ca, 14-18% Mn, 53-59% Si.

Carloads, bulk	23.00
Ton lots	26.15
Less ton lots	27.15

SMZ

Cents per pound of alloy, delivered, 60-65% Si, 5-7% Mn, 5-7% Zr, 20% Fe ½ in. x 12 mesh.

Ton lots	21.15
Less ton lots	22.40

V Foundry Alloy

Cents per pound of alloy, f.o.b. Suspension Bridge, N. Y., freight allowed max. St. Louis, V-5: 38-42% Cr, 17-19% Si, 8-11% Mn, packed.

Carload lots	18.45
Ton lots	19.95
Less ton lots	21.20

Graphidox No. 4

Cents per pound of alloy, f.o.b. Suspension Bridge, N. Y., freight allowed, max. St. Louis, Si 48 to 52%, Ti 9 to 11%, Ca 5 to 7%.

Carload bulk	19.20
Ton lots to carload packed	21.15
Less ton lots	22.40

Ferromanganese

Maximum base price, f.o.b., lump size, base content 74 to 76 pct Mn. Carload lots, bulk

Producing Point	Cents per-lb
Marietta, Ashtabula, O.; Alloy, W. Va.; Sheffield, Ala.; Portland, Ore.	11.00
Houston, Tex.	11.00
Johnstown, Pa.	11.00
Lynchburg, Va.	11.00
Neville Island, Pa	11.00
Sheridan, Pa.	11.00
Philo, Ohio	11.00
Rockwood, Tenn.	11.00
S. Duquesne	11.00

Add or substract 0.1¢ for each 1 pct Mn above or below base content.

Briquets, delivered, 66 pct Mn:

Carloads, bulk	13.70
Ton lots packed in bags	16.10

Spiegeleisen

Per gross ton, lump, f.o.b., 3% Si max.

Mn		Palmerton, Pa. 10 lb, pig	Palmerton, Pa. 35 lb, down	Neville Is., Pa. 35 lb
16-19%	..	$98.00	$96.00	$100.50
19-21%	..	100.00	98.00	102.50
21-23%	..	102.50	100.00	105.50

Manganese Metal

2 in. x down, cents per pound of metal delivered.

95.50% min. Mn, 0.2% max. C, 1% max. Si, 2.5% max. Fe.

Carload, packed	45.75
Ton lots	47.25

Electrolytic Manganese

F.o.b. Knoxville, Tenn., freight allowed east of Mississippi, f.o.b. Marietta, O., delivered, cents per pound.

Carloads, bulk	34.25
Ton lots, palletized	36.25
250 to 1999 lb	39.00
Premium for Hydrogen - removed metal	0.75

Medium Carbon Ferromanganese

Mn 80 to 85%, C 1.25 to 1.50, Si 1.50% max., carloads, lump, bulk, delivered, per lb of contained Mn 24.00

Low-Carb Ferromanganese

Cents per pound Mn contained, lump size, packed, del'd Mn 85-90%.

	Carloads (Bulk)	Ton	Less
0.07% max. C, 0.06% P, 90% Mn	37.15	39.95	41.15
0.07% max. C	35.10	37.90	39.10
0.10% max. C	34.35	37.15	38.35
0.15% max. C	31.10	33.90	35.10
0.30% max. C	29.80	32.60	33.80
0.50% max. C	28.50	31.30	32.50
0.75% max. C, 80.85% Mn, 5.0-7.0% Si	27.00	29.80	31.00

Silicomanganese

Lump size, cents per pound of metal, 65-68% Mn, 18-20% Si, 1.5% max. C for 2% max. C, deduct 0.3¢ f.o.b. shipping point.

Carloads bulk	11.60
Ton lots, packed	13.25
Carloads, bulk, delivered, per lb of briquet	14.00
Briquets, packed pallets, 2000 lb up to carloads	16.40

Silvery Iron (electric furnace)

Si 15.50 to 16.00 pct., f.o.b. Keokuk, Iowa, or Wenatchee, Wash., $106.50 gross ton, frieght allowed to normal trade area. Si 15.01 to 15.50 pct, f.o.b. Niagara Falls, N. Y., $93.00.

Silicon Metal

Cents per pound contained Si, lump size, delivered, packed.

	Ton lots,	Carloads,
98.25% Si, 0.50% Fe	22.95	21.65
98% Si, 1.0% Fe	21.95	20.65

Silicon Briquets

Cents per pound of briquets, bulk, delivered, 40% Si, 2 lb Si, briquets.

Carloads, bulk	8.00
Ton lots, packed	10.80

Electric Ferrosilicon

Cents per lb contained Si, lump, bulk, carloads, f.o.b. shipping point.

50% Si	13.50	75% Si	16.90
65% Si	15.75	85% Si	18.60
90% Si	20.00		

Ferrovanadium

50-55% V delivered, per pound, contained V, in any quantity.

Openhearth	3.20
Crucible	3.30
High speed steel	3.40

Calcium Metal

Eastern zone, cents per pound of metal, delivered.

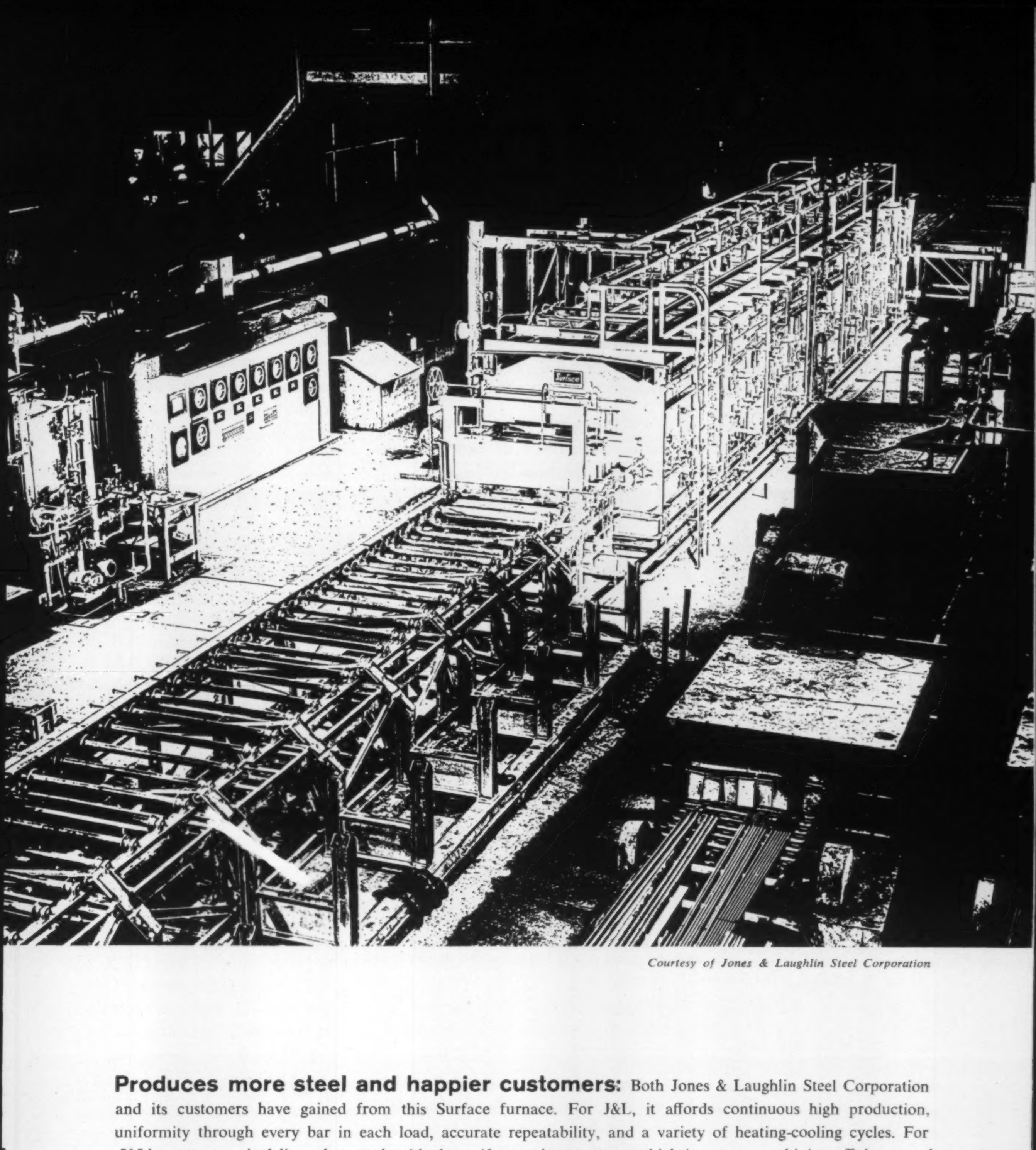
	Cast	Turnings	Distilled
Ton lots	$2.05	$2.95	$3.75
100 to 1999 lb	2.40	3.30	4.55

(Effective Oct. 9, 1961)

Alsifer, 20% Al, 40% Si, 40% Fe, f.o.b. Suspension Bridge, N. Y. per lb.	
Carloads, bulk	9.85¢
Ton lots	11.20¢
Calcium molybdate, 43.6-46.6% f.o.b. Langeloth, Pa., per pound contained Mo	$1.63
Ferrocolumbium, 58-62% Cb, 2 in. x D, del'd per lb con't Cb	
Ton lots	$3.45
Less ton lots	3.50
Ferro-tantalum-columbium, 20% Ta, 40% Cb, 0.30% C, del'd ton lots, 2-in. x D per lb con't Cb plus Ta	$3.40
Ferromolybdenum, 55-75%, 200-lb containers, f.o.b. Langeloth, Pa., per pound contained Mo	$1.89
Ferrophosphorus, electric, 23-26%, car lots, f.o.b. Siglo, Mt. Pleasant, Tenn., $5.00 unitage, per gross ton	$120.00
10 tons to less carload	$131.00
Ferrotitanium, 40% regular grade 0.10% C max., f.o.b. Vanadis, O., O., freight allowed, ton lots, per lb contained Ti	$1.35
Less ton lots (200 lb and up)	$1.37
Ferrotitanium, 30% low carbon, 0.10% C max., 27-32% Ti, Vanadis, O., freight allowed, per lb contained Ti, ton lots	$1.35
Less ton lots (200 lb and up)	$1.40
Ferrotitanium, 1-3% Carbon, 17-20% Ti, f.o.b. shipping point, freight allowed, carload per net ton	$250.00
Ton lots	$260.00
Ferrotungsten, ¼ x down packed per pounds contained W, ton lots delivered	$2.45 (nominal)
Molybdic oxide, briquets per lb. contained Mo, f o.b. Langeloth, Pa.	$1.62
bags, f.o.b. Washington, Pa., Langeloth, Pa.	$1.59
Simanal, 20% Si, 20% Mn, 20% Al, f.o.b. Philo, Ohio, freight allowed per lb.	
Carload, bulk lump	18.50¢
Ton lots, packed lump	20.50¢
Less ton lots	21.00¢
Vanadium oxide, 86-89% V_2O_5 per pound contained V_2O_5	$1.38
Zirconium silicon, per lb of alloy 35-40% del'd, carloads, bulk	26.25¢
12-15%, del'd lump, bulk-carloads	9.25¢

Boron Agents

Borosil, per lb of alloy del. f.o.b. Philo, Ohio, freight allowed, B 3-4%, Si 40-45%, per lb contained B	
2000 lb carload	$5.50
Ferro Zirconium Boron, Zr 50% to 60%, B 0.8% to 1.0%, Si 8% max., C 8% max., Fe balance, f.o.b. Niagara Falls, New York, freight allowed, in any quantity per pound	30¢
Corbortam, Ti 15-21%, B 1-2%, Si 2-4%, Al 1-2%, C 4-5-7.5%, f.o.b., Suspension Bridge, N. Y., freight allowed.	
Ton lots per pound	18.25¢
Ferroboron, 17.50 min. B, 1.50% max. Si, 0.50% max. Al, 0.50% max. C, 1 in. x D, ton lots	$1.20
F.o.b. Wash., Pa., Niagara Falls, N. Y., delivered 100 lb up	
10 to 14% B	.85
14 to 19%	1.20
19% min. B	1.50
Grainal, f.o.b. Cambridge, O., freight, allowed, 100 lb & over	
No. 1	$1.05
No. 79	50¢
Manganese-Boron, 75.00% Mn, 17.50% B, 5% max. Fe, 1.50% max. Si, 3.00% max. C, 2 in. x D, del'd	
Ton lots (packed)	$1.46
Less ton lots (packed)	1.57
Nickel-Boron, 15-18% B, 1.00% max. Al, 1.50% max. Si, 0.50% max. C, 3.00% max. Fe, balance Ni, del'd less ton lots	2.15



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Pittsburgh Cautious But Gains Sighted

Dealers in Pittsburgh report hesitation and caution in all lines.

But there are signs of improvement. Machine tool and rolling mill demand has increased.

▪ Pittsburgh dealers report signs of improvement. But there is no assurance yet of a sustained recovery.

Demand has increased for machine tools, fabricating equipment and rolling mills. Orders for electrical machinery are lagging again. There is still hesitation and caution in all lines.

Mill Strength—In the mill equipment field, there has been general improvement. Demand for merchant bar mills is strong.

One supplier says there is a ready market for any bar line that is not too obsolete. A line now being offered is drawing inquiries from Asia and South America.

Strength of domestic demand is a little surprising, since bar mills have been installed in recent years in Florida, South Carolina, Tennessee, Texas, California and other points. Moreover, imported reinforcing bars have cut into the U. S. market.

Bar Profits—Despite added competition, bar production is apparently still profitable and growing.

Smaller mills were busier than big integrated producers in the last recession. Contractors and warehouses are pushing to get in the field.

This is explained by a machinery man as a combination of low capital cost, low freight rates and favorable pricing. The small rebar supplier can start off with an equipment investment of less than $200,000. He requires only a 350 ft bay.

With this kind of operation, the rebar producer doesn't need heavy volume. He does not have to reach out for orders or materials. He can produce in small quantities and sell at close to warehouse prices. He has enough margin to go after desirable business on a spot basis.

Long Term?—How long this condition will last is a question. A few years ago, small specialty strip producers enjoyed the same kind of prosperity. Now, the strip field is overcrowded and competitive.

A less optimistic report comes from a supplier of electrical equipment. Business was fairly good for this dealer until about two weeks ago. Now, orders are lagging. The explanation seems to be that steel mills are buying day-to-day, taking only what they must and cutting back when their own market wavers.

Tight Controls—Indicating the tightness of buying controls, one steel mill spent two months dickering for a motor generator set. Then the mill came in with a rush order. A generator had blown and the mill was operating with no spares.

Prices are still rough in the electrical field. According to a dealer, prices on some new equipment have dropped on occasion to the give-away level.

General Gains—In the general machinery field, improved demand is reported by several dealers. One says both inquiries and orders are up.

Customers are still cautious. But it is felt a turning point has at last been reached.

ROLLING MILLS—STEEL WORKS EQUIPMENT

1—38" CONTINUOUS HOT STRIP MILL.
1—40" 2-HIGH BLOOMING MILL.
1—3-HIGH PLATE MILL, 40" & 26½" x 112".
1—32" & 20" x 56" 3-HIGH SHEET MILL, with motor driven screwdown and pre-set controls.
1—25" & 42" x 66" HOT STRIP MILL, 4-high.
2—29" 2-HIGH HOT SHEET MILLS with tables.
1—26" COLD SHEET MILL TRAIN, 5 stands.
1—16" x 28" COLD MILL, 2-high, 200 HP drive.
2—10" x 14" 2-HIGH COLD MILLS, 100 HP DC drives, with one coiler.
1—8" x 12" 2-HIGH COLD MILL, 50 HP motor.
1—3½" & 8½" x 5½" STRIP MILL, 4-high.
1—16" BAR MILL, 3-high, single stand.
1—10" BAR MILL, 3-high, 5 stands with two 16" 3-high roughing stands, drives, tables, flying shear double hot bed.
1—9" BAR MILL, 3-high, five stands.
3—HOT STRIP DOWNCOILERS for widths up to 75", max. coil diameter 54".
1—VERTICAL OPEN-SIDE BAR SHEAR, 28".
2—SQUARING SHEARS for ¼" x 156" sheets.
1—LEVELLER FOR ¼" PLATES, 9 rolls, 9" dia. x 108" face, 1940.
2—LEVELLERS FOR SHEETS, 17 rolls, widths 42" and 66", rolls 4" dia.
1—AUTOMATIC SQUARING SHEAR UNIT for sheets, 160" side cut, 62" end cut.
1—ROLL GRINDER, 36" x 12', heavy duty, crowning, concaving and tapering.
1—ROLL LATHE, ENCLOSED HEADSTOCK, up to 24" dia. rolls.
2—42" WIDE COIL-BUILD-UP LINES.
1—3000 HP GEAR DRIVE, ratio 4.6 to 1.
1—1200 HP GEAR DRIVE, ratio 9.47 to 1.
1—400 HP GEAR DRIVE, ratio 8.2 to 1.
1—3000 HP MOTOR, 2300/3/60, 356 RPM.
1—1200 HP MOTOR, 6600/3/60, 295 RPM.
1—600 HP MOTOR, 2300/4600 volts, 3 phase, 60 cycle, 450 RPM.
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1—HALL PLANETARY THREAD MILLING MACHINE, special oversize for external & internal 3" thread & 6" spindle, 16" flange ways extends 12" to 24". Complete with all air operated attachments and variable speed change gear.

2—ROGERS GRINDERS, facing or end, 72" capacity, dual controls. Complete with automatic cross feed, vari-speed reversing motors and attachments.

3—NILES AXLE LATHES #3, 28" swing x 8' centers with hydraulic feed to both carriages. Complete.

1—STANDARD MODEL 1070 THERMONIC INDUCTION GENERATOR, complete with transformers, work tables, Co-axial Equalizers, high voltage interlocks, 20/40 KW.

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5 ton-50'-AC, W/300' of "A" Frame Runway, M.G. Set, Magnet, Bucket.

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175 KW AJAX Induction Mltg. Installation Ideal for non-ferrous work. With 2 lift coils, has tilting furnace for steel melting
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42" Mesta Slitting Line, New 1940, consists of: Cone Type Uncoiler with hydraulic lift, Tensioning Machine, 42" x 5½" Arbor Motor Driven Slitter, Recoiler with hydraulic stripper and 80 H.P. variable speed drive. Complete with all motors, electrics, 100 H.P. M.G. Set and Desk Type Control Stand.

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12" x 20" SCHMITZ, coiler & blocker, 75 HP AC main drive.

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28" width, with 20 HP DC drive motors (1 new 1948).

FOUR (4) TORRINGTON SLITTERS

2—for 25" wide x .100 alum., 10 HP drive, with rewind & MD scrap-chopper (1 new 1948).

2—for 15½" wide x .040 alum., 5 HP drive, with rewind & MD scrap-chopper (1 new 1946).

THREE (3) TORRINGTON FLATTENERS

11-roll, 44" wide x 3" dia., 10 HP AC motor.
11-roll, 32" wide x 2¼" dia., 5 HP AC motor.
9-roll, 32" wide x 2¼" dia., 5 HP AC motor.

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BOX H-217
c/o IRON AGE, Chestnut at 56th, Phila. 39

ELECTRICAL POWER EQUIPMENT

MOTOR GENERATOR SETS

KW	MAKE	A.C.V.	D.C.V.
1750	G. E.	4160/2300	250/300
1250	West.	4160/2300	250
1000	West.	4160/2300	250
750	G. E.	4160/2300	250
600	G. E. (3 unit)	2300/440	125/250
500	G. E.	2300	250
400	Al.-Ch.	2300/440	125/250
200	G. E.	2300	250
150	West.	440	250

D. C. MOTORS

HP	RPM	MAKE	VOLTS	TYPE
1500	300	West.	250	TEFV
850	250/500	West.	250	QM
600	250/500	G. E.	600	DBL. ARM
500	210	G. E.	250	MCF
400	1150	REL.	250	T-1970
400	300/900	G.M. (2)	250	D4D
300	575/1150	West	250	CB-509
200	700	West	250	SK-201
150	380/1000	G. E.	250	MCF
150	1150	G.E. (2)	250	RC-37

SQUIRREL CAGE MOTORS

HP	RPM	MAKE	VOLTS	TYPE
1500	1800	Al.-Ch.	2300	Ventilated
1250	3600	Al.-Ch.	4000	DP/PF
800	600	West.	2300	CS-44
500	1800	G. E.	2300	KT-565Y
500	1200	G. E.	2300	FT-567
350	1200	West.	440	CS-3255-6H

SLIP RING MOTORS

HP	RPM	MAKE	VOLTS	TYPE
2500	257	G. E.	6600	MT-28
1000	1200	Al.-Ch.	4000	ANY
1000	900	Al.-Ch.	2300	ANY
700	720	G. E.	440	I-M
600	1800	G. E.	4160	M-6345
500	1200	G. E.	440	M-6345Z
400	1200	West.	2300	CW
400	720	G. E.	440	MT-573Y
350	1800	Al.-Ch.	2300	ARYW
300	900	G. E.	440	IM-17

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METALLURGIST—graduate, age 28-40, for steel manufacturer. Prefer experience in stainless or alloy steel production. Plant located Middle Atlantic area. In resume furnish education, complete work history, salary expected. Equal opportunities employer. Write

BOX H-225
c/o IRON AGE, Chestnut at 56th, Phila. 39

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The Portsmouth Naval Shipyard needs several high calibre Industrial Engineers, including two Supervisors, for the Methods and Standards Branch of the Production Engineering Division. These positions involve such programs as work and performance measurement, work standards and methods improvement. Some shipbuilding experience preferred.

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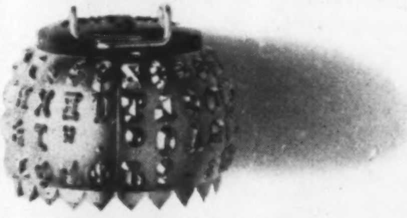

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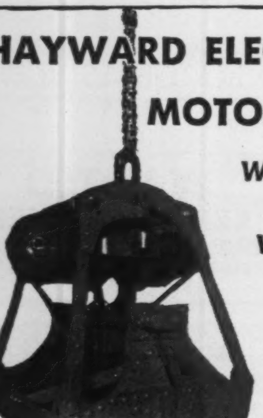

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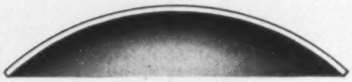

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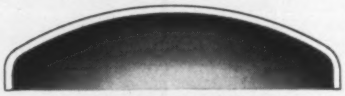

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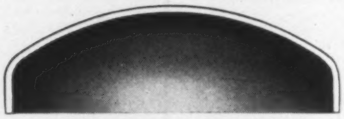

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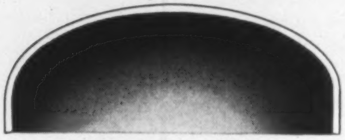

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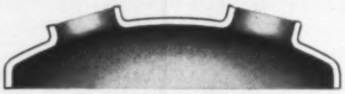

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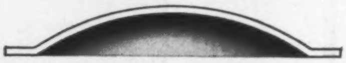

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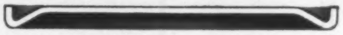

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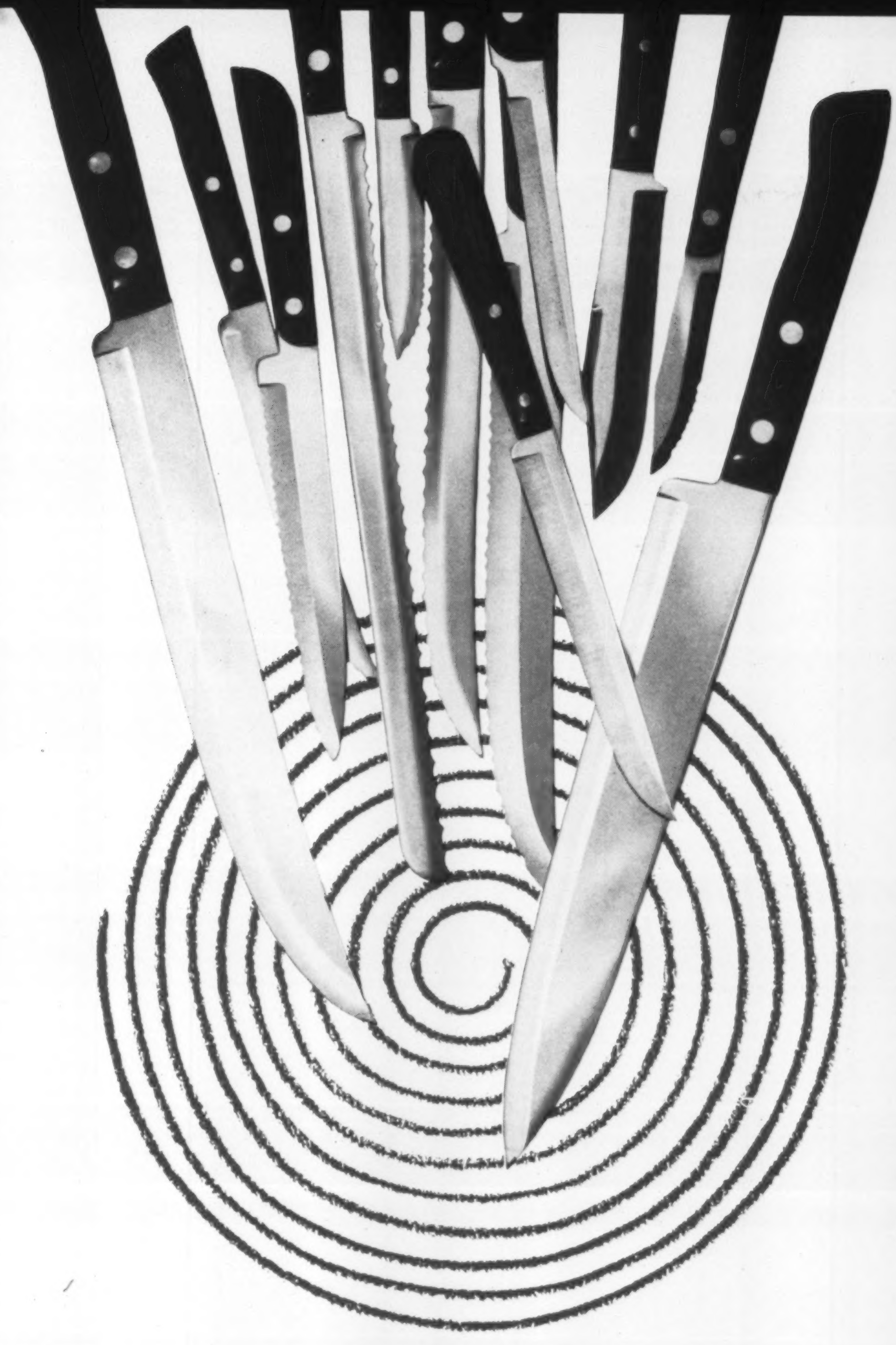

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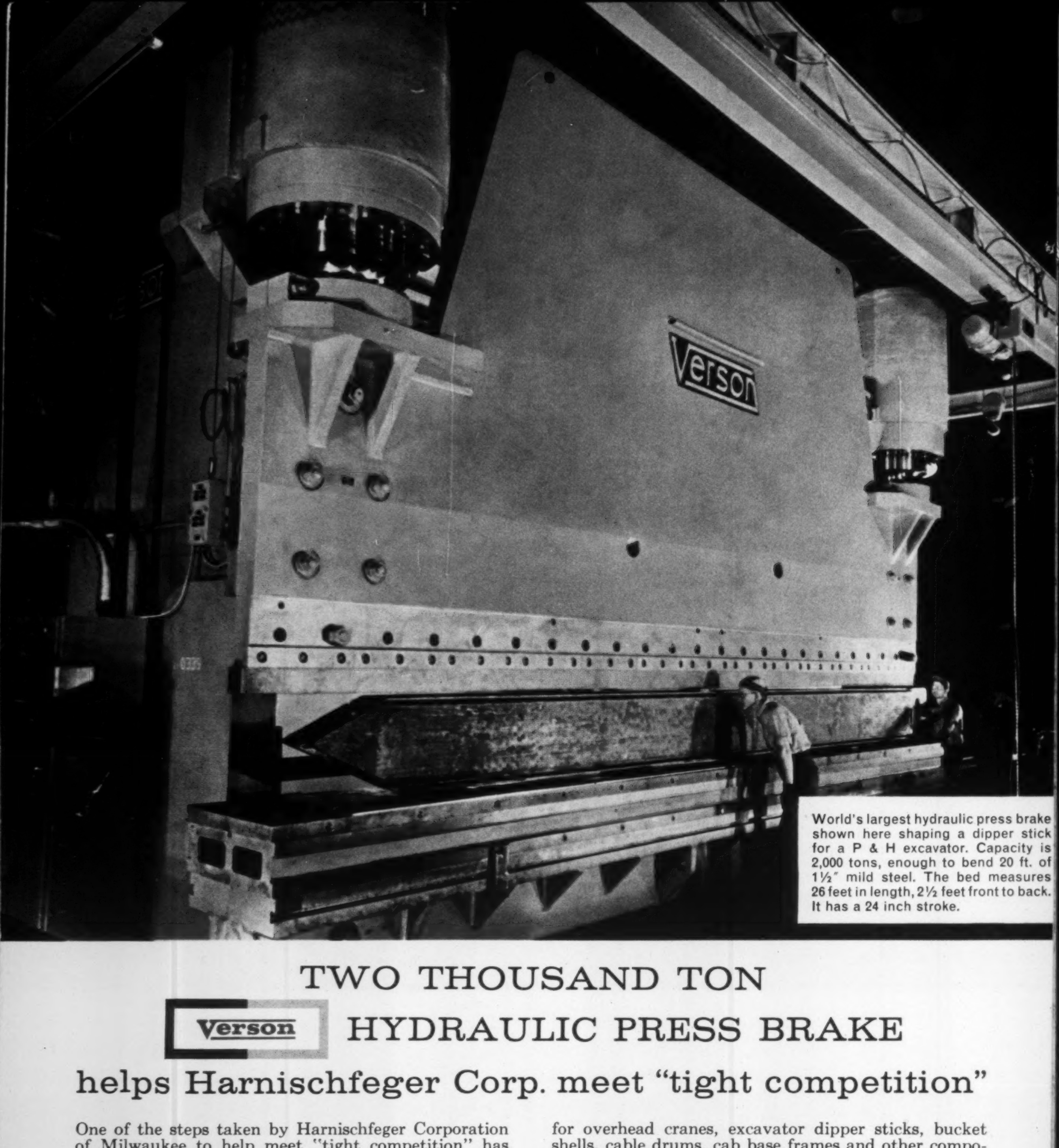

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